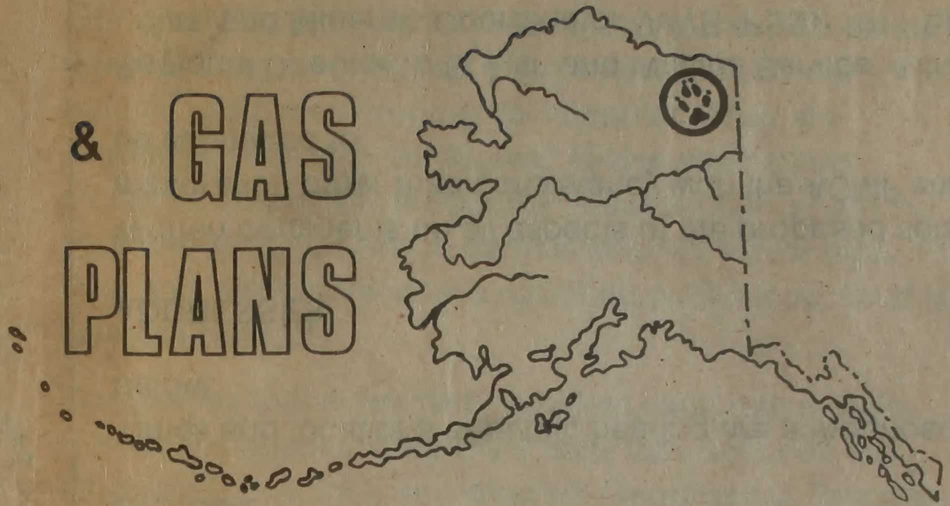
OIL & GAS EXPLORATION PLANS



FOR THE COASTAL PLAIN ARCTIC NATIONAL WILDLIFE REFUGE

Submitted to the U.S. Fish & Wildlife Service June 1984

POLAR
PAM
1657

POLARPAM

SUMMARY: This notice contains the complete texts of four industry-proposed plans for oil and gas exploration (seismic studies) on the coastal plain of the Arctic National Wildlife Refuge, Alaska. A formal request to revise a seimic exploration plan that was previously approved by the U.S. Fish and Wildlife Service is also included in this notice. Dates and locations of four public hearings that will be held to receive comments on the plans and the revision request are announced. Written comments are solicited as well.

The U.S. Fish and Wildlife Service invites public comments on all aspects of the proposed exploration. The State of Alaska is reviewing the proposals for consistency with the Alaska Coastal Management Program (ACMP). This notice also solicits written comments, to be submitted to the State of Alaska, concerning ACMP consistency.

The proposals were submitted to the Fish and Wildlife Service on June 4, 1984, by companies interested in conducting seismic exploration on the Arctic National Wildlife Refuge coastal plain. The proposals were accepted by the Fish and Wildlife Service in accordance with the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) as amended. ANILCA provides for oil and gas exploration within the coastal plain of Arctic National Wildlie Refuge in a manner that avoids significant adverse effects to the fish and wildlife, their habitats, or the environment. Data from the exploration on Arctic National Wildlife Refuge will be used to prepare a "Report to Congress" (ANILCA Section 1002(h) which will, among other things, recommend whether further exploration, development, and production of oil and gas should be permitted.

DATES:

To be considered, written comments must be submitted to the Fish and Wildlife Service no later than August 10, 1984.

Comments on consistency of these plans with the ACMP must be submitted to the State of Alaska no later than July 27, 1984.

Times and locations of public hearing are announced below.

ADDRESSES:

Written comments on all aspects of the proposed seismic exploration other than consistency with the ACMP should be submitted to:

Regional Director, U.S. Fish and Wildlife Service, Attn: Oil,
Gas, and Minerals Coordinator (AWR/PSS), 1011 East
Tudor Road, Anchorage, Alaska 99503

Written comments concerning consistency of the exploration plans with the ACMP should be submitted to:

State of Alaska, Division of Governmental Coordination,
Northern Regional Office, 675 Seventh Avenue. Station
H, Fairbanks, Alaska 99701

FOR FURTHER INFORMATION CONTACT: Ted Heuer at (907) 786-3384 or Ann Rappoport at (907) 786-3398.

SUPPLEMENTARY INFORMATION:

Regulations governing oil and gas exploration within the coastal plain of the Arctic National Wildlife Refuge, were published in the Federal Register on Tuesday, April 19, 1983. Copies of these regulations are available from the U.S. Fish and Wildlife Service at the above address. The regulations require that persons interested in exploring for oil and gas on the coastal plain of Arctic National Wildlife Refuge submit exploration plans to the Alaska Regional Director of the Fish and Wildlife Service. The regulations also require that the texts of the exploration plans be published in the Federal Register and newspapers of general circulation in the State of Alaska.

The proposal of Geophysical Service Inc. (GSI), printed herein, is not an exploration plan but a formal request to revise a previously approved plan. GSI's original plan was conditionally approved by the Alaska Regional Director of the Fish and Wildlife Service on September 16, 1983. One condition placed on that plan was that the conventional shothole/explosive technique be used rather than mechanical vibrators. The Fish and Wildlife Service felt that the shothole technique would allow more flexibility in avoiding sensitive wildlife habitats.

GSI used the shothole technique during the 1984 winter season. They now believe that a change to vibrators would "reduce environmental impacts". They are requesting that they be allowed to use mechanical vibrators during any subsequent season(s) in which the Fish and Wildlife Service permits seismic exploration. The Fish and Wildlife Service is soliciting public input on this revision request.

Companies that submitted complete exploration plans (i.e., ARCO Alaska, Inc.; CGG American Services, Inc.; Chevron U.S.A. Inc.; and Western Geophysical Company of America) provided maps (1:250,000 scale) to the Fish and Wildlife Service that show their proposed seismic lines, travel routes to and within the refuge, fuel caches, and major support facilities. Persons wishing to examine these maps may do so at the Fish and Wildlife Service Regional Office, Anchorage, Alaska, or at the Arctic National Wildlife Refuge Office in Fairbanks, Alaska. Copies may also be obtained by calling the numbers listed above.

All of the proposals printed in this notice require the approval of the Fish and Wildlife Service Alaska Regional Director before any exploration can begin. The final decision whether or not to permit seismic exploration on Arctic National Wildlife Refuge during the winter of 1984-85 will not be made until the Fish and Wildlife Service has had an opportunity to: 1) assess the impacts of last winter's seismic program and 2) review the exploration data that were collected by industry. The Fish and Wildlife Service will allow a second season of seismic work only if it is judged that additional data are necessary for the "Report to Congress", and that data can be collected without significant adverse effects to the fish and wildlife, their habitats, or the environment. All public comments will be considered before the Regional Director approves or disapproves of any proposal. Leasing, exploratory drilling, and other development leading to production of oil and gas is prohibited on Arctic National Wildlife Refuge by ANILCA Section 1003 and can only be authorized by legislative action. The Fish and Wildlife Service intends to approve, approve with modifications, or disapprove all exploration plans and the revision request by September 2, 1984 (90 days following plan submission). Written comments on all seismic exploration must be received by the Fish and Wildlife Service no later than August 10, 1984.

The Fish and Wildlife Service is soliciting public comments on all aspects of the proposed exploration, but particularly to the potential impacts that these actions, if approved, may have on fish, wildlife, their habitats or the environment. Another area of specific concern is the potential effects of the proposed actions on subsistence uses and needs on the Arctic National Wildlife Refuge coastal plain. Public hearings will be used to gather testimony on the above concerns. Times and locations of these public hearings are noted below.

All of the applicants have certified that their activities will be conducted in a manner consistent with the standards of the ACMP. The State of Alaska is currently reviewing the proposals to determine if the proposed activities are consistent with ACMP standards. Interested persons are requested to submit comments to the State of Alaska at the address given above. The deadline for submitting these comments is July 27, 1984.

PUBLIC HEARINGS:

Monday, July 16, 1984
Anchorage, Alaska
Location: Regional Office, U.S. Fish and Wildlife Service, Room 1110, 1011 East Tudor Road
Time: 7:00 p.m.

Tuesday, July 17, 1984
Kaktovik, Alaska
Location: City Council Meeting Hall
Time: 7:00 p.m.

Wednesday, July 18, 1984

Fairbanks, Alaska

Location: Federal Building and Courthouse,
Room 236, 101 12th Avenue

Time: 7:00 p.m.

Thursday, July 19, 1984

Arctic Village, Alaska

Location: Community Hall

Time: 7:00 p.m.

PROPOSED ACTIVITIES: The texts of the seismic exploration plans and the revision request submitted to the Fish and Wildlife Service on June 4, 1984 are presented on the following pages.

GEOPHYSICAL EXPLORATION PLAN
FOR
THE COASTAL PLAIN OF THE
ARCTIC NATIONAL WILDLIFE REFUGE,
ALASKA

SUBMITTED BY: ARCO ALASKA, INC.

SUBMITTED TO: REGIONAL DIRECTOR
REGION 7
U.S. FISH AND WILDLIFE SERVICE
1011 EAST TUDOR ROAD
ANCHORAGE, ALASKA 99503

ON

JUNE 4, 1984

ARCTIC NATIONAL WILDLIFE REFUGE - COASTAL PLAIN
ARCO Seismic Program

EXPLORATION PLAN

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Note:

Items 1 through 15 are references to the items required to be contained in an Exploration Plan by 50 CFR §37.21(d)(1) through (15) of the final rules governing geological and geophysical exploration of the coastal plain of the Arctic National Wildlife Refuge, as published in the Federal Register, April 19, 1983. The description of each of these 15 items in this Table of Contents is intended as a summary of the requirement of each of the 15 elements of 50 CFR §37.21(d)(1) through (15), and the text directly addresses those 15 elements in detail. It must be noted that 50 CFR §37.21(d)(15) requires an applicant to submit "such other pertinent information as the Regional Director may reasonably require". ARCO Alaska, Inc. delivered a letter dated February 2, 1984 to the Regional Director requesting that any additional information required for this Exploration Plan be specified in order to be included herein. The further information requested by the Regional Director in response to that letter is discussed in Item 15 of this Exploration Plan.

ARCO Alaska, Inc.
ARCO Exploration - Alaska Operations
Post Office Box 100360
Anchorage, Alaska 99510
Telephone 907 277 5637

June 4, 1984

Dr. Robert Putz
Regional Director
U. S. Fish & Wildlife Service
1011 Tudor Road
Anchorage, AK 99503

Dear Dr. Putz:

Geophysical Exploration Plan for the Coastal Plain of the Arctic National Wildlife Refuge

ARCO Alaska, Inc., hereby submits the subject Exploration Plan pursuant to 50 CFR 37.

The proposed program is generally designed to infill and to complete the 1984 GSI ANWR group program in which ARCO is a participant. The preliminary results of that activity indicate that the subsurface geological structure of the coastal plain area is too complicated to be reasonably interpreted on the basis of the six-by-twelve mile grid approved last year.

ARCO will reconfigure its proposed 760 mile program in consultation with you as necessary to complement the newly acquired data base. Although this Plan addresses only the specifics of field activities proposed for the period of January through early May 1985, this Plan also extends to any similar activities that may be necessary for the period ending May 31, 1986. Specific details of 1986 activities would of course, depend upon the outcome of the 1984 and 1985 programs.

We appreciate your consideration of our proposed Exploration Plan.

Sincerely,

Stephen Gajewski

Stephen Gajewski

SWG:rll

ARCO Alaska, Inc. is a Subsidiary of AtlanticRichfieldCompany

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ITEM i

Alaska Coastal Management Program

ARCO Alaska, Inc. hereby certifies, to the best of our knowledge, that the proposed activity, as described in this Exploration Plan, complies with the State of Alaska's approved coastal management program and will be conducted in a manner consistent with such program.

ITEM 1

RESPONSIBLE OFFICIAL

The proposed activity described in this Exploration Plan will be conducted by ARCO Alaska, Inc. (hereinafter called "ARCO"), a wholly owned subsidiary of the Atlantic Richfield Company. The responsible official for conduct of this operation is Mr. G. T. Wilkinson, Executive Vice President, ARCO, P.O. Box 100360, Anchorage, AK 99510-0360.

ITEM 2

PARTICIPANTS

ARCO is submitting this plan on behalf of itself and of an unspecified group open to all interested parties in accordance with 50 CFR 37.13.

ITEM 3

EVIDENCE OF TECHNICAL & FINANCIAL ABILITY

ARCO is both technically and financially able to conduct the proposed activities described in this Exploration Plan. ARCO has in excess of two thousand employees in the State of Alaska and maintains a large and highly qualified staff of petroleum explorationists.

FINANCIAL ABILITY

As evidence of financial ability, ARCO submits the following table reflecting the Consolidated Balance Sheets for 1981, 1982, and the first three quarters of 1983 of its parent corporation, the Atlantic Richfield Company. These tables are excerpted from the Atlantic Richfield Company 1982 Annual Report and 1983 Third Quarter Report. Copies of these reports are available upon request.

TABLE 1

CONSOLIDATED BALANCE SHEET
(Millions of dollars)

Assets	1st 3 Qtrs. 1983	1982	1981
Current Assets:			
Cash	$ 100	$ 296	$ 114
Short-term investments	595	479	398
Accounts receivable	1,224	1,313	1,995
Inventories	1,377	1,572	1,753
Prepaid expenses and other current assets	224	122	189
	3,520	3,782	4,449
Investments and Long-term Receivables:			
Affiliated companies accounted for on the equity method	1,227	1,110	894
Other investment and long-term receivables, at cost	628	582	325
	1,855	1,692	1,219
Fixed Assets:			
Property, plant and equipment, including capitalized leases	24,589	22,745	19,845
Less accumulated depreciation, depletion and amortization	7,884	6,975	6,169
	16,705	15,770	13,676
Deferred Charges	376	389	388
	$22,456	$21,633	$19,732

TABLE 1 (cont'd)

Liabilities and Shareholders' Equity

	1st 3 Qtrs 1983	1982	1981
Current Liabilities:			
Notes payable	$ 121	$ 261	$ 327
Accounts payable	1,614	2,046	2,097
Taxes payable, including excise taxes collected from customers	309	117	341
Long term debt and capital leases obligations due within one year	275	319	463
Advances and production payments due within one year	77	26	58
Accrued Interest	146	140	119
Other	372	367	381
	2,914	3,276	3,786
Long-Term Debt	3,654	3,501	3,239
Capital Lease Obligation	401	400	445
Advances and Production Payments	1,108	1,170	772
Deferred Income Taxes	2,994	2,704	2,302
Other Deferred Liabilities and Credits	837	713	524
Shareholders' Equity:			
Capital stock	658	655	641
Capital in excess of par value of stock	1,243	1,219	1,081
Retained earnings	8,701	8,025	6,943
Foreign currency translation	(54)	(30)	---
	10,548	9,869	8,665
	$22,456	$21,633	$19,733

TECHNICAL ABILITY

ARCO has been active in Alaska for over twenty-five years and during this time has conducted extensive operations on the North Slope. ARCO has obtained and complied with the conditions of hundreds of permits for North Slope activities, ranging from geophysical exploration to development of the Prudhoe Bay and Kuparuk oil fields. ARCO maintains an Environmental Conservation Department and a Regulatory Compliance Engineering section to ensure that all operations are carried out in compliance with all permit conditions.

As further evidence of ARCO's technical ability to conduct the geophysical survey program outlined in this Exploration Plan and as a reference for verifying ARCO's past compliance with permit stipulations, the following three tables are submitted which list the twenty-five geophysical surveys which ARCO has operated from 1965 through 1983.

TABLE 2

ARCO OPERATED GROUP GEOPHYSICAL PROGRAMS

YEAR	CONTRACTOR	GENERAL AREA COVERED	MILEAGE ACQUIRED	PERMIT/AGENCY NUMBER
1974	Western Geophysical	Beaufort Sea Ice	94	N/A
1975	GSI	North Slope - Beaufort Sea	200	N/A
1977	GSI	Beaufort Sea	396	OCS 76-73
1978	Western Geophysical	Beaufort Sea	150	MLUP 78-145
1979	Western Geophysical	Beaufort Sea	385	MLUP 78-144
1980-81	GSI	North Slope	1,289	MLUP 80-245
1983	GSI	Prudhoe Bay Unit	217	MLUP 82-199
Total ARCO Operated Group Seismic Survey Miles			2,731	

MLUP - State of Alaska Permits

TUP - Bureau of Land Management Permits

OCS - United States Geological Survey/Minerals Management Service Permits

N/A - Permit number not available or assigned

TABLE 3

ARCO PROPRIETARY GEOPHYSICAL PROGRAMS

YEAR	CONTRACTOR	GENERAL AREA COVERED	MILES ACQUIRED	PERMIT/AGENCY NUMBER
1965	Ray-Flex	Southern North Slope	178	N/A
1969	GSI	Southeastern North Slope	17	N/A
1970	Digicon	N. Prudhoe Bay	62	N/A
1971	GSI	Flaxman Island Pt. Thomson Area	61	N/A
1975	Western Geophysical	E. Prudhoe Bay Detail	72	N/A
1976	United Geophysical	Gull Is. Detail	10	N/A
1978	Western	Pt. Thomson Detail	300	MLUP 78-29
1981	GSI	NPRA Area	176	TUP F-72866
1982	Norpac Exploration Co. Inc.	NPRA Area	237	TUP AK 029-SP2-016
1983	Norpac Exploration Co. Inc.	NPRA Area	370	TUP F-81238

Total Proprietary Seismic Survey Miles: 1,483

MLUP - State of Alaska Permits

TUP - Bureau of Land Management Permits

OCS - United States Geological Survey/Minerals Management Service Permits

N/A - Permit number not available or assigned

TABLE 4

ARCO JOINT GEOPHYSICAL VENTURES (ARCO OPERATED)

YEAR	CONTRACTOR	GENERAL AREA COVERED	MILES ACQUIRED	PERMIT/AGENCY Number
1970	Seiscom Delta	Canning River	13	N/A
1979	Western	N. Prudhoe Detail	48	N/A
1981	GSI	Upper Kavik Detail	200	MLUP/NS 80-268, 326
1981-82	GSI Western	Canning Detail/ Uplands Canning North Slope	232	MLUP 80-266, 304, 330
1982	Western	Arctic Slope Franklin Bluffs	151	MLUP 81-178, 219
1982	Western	N. Prudhoe/Gwydyr	75	MLUP 81-218
1982	Western	Kuparuk Swath	233	MLUP 81-217
1983	Western	Milne Point	50	MLUP 83-22

Total ARCO Operated Joint Venture Seismic Survey Miles: 1,002

GRAND TOTAL of Tables 2,3, and 4: 5,216 Seismic Survey Miles

MLUP - State of Alaska Permits

TUP - Bureau of Land Management Permits

OCS - United States Geological Survey/Minerals Management Service Permits

N/A - Permit number not available or assigned

ITEM 4

ACTIVITY MAP/PROGRAM SCOPE

A 1:250,000 scale and an 8½" X 11" one-page topographic program maps, attached to and made a part of this Exploration Plan, illustrate locations of existing and proposed geophysical profiles, general travel routes to program areas, and Special Areas and sites identified by the Regional Director as potentially being impacted by the proposed activity.

The program map depicts the 1984 GSI ANWR group survey as broken lines and the proposed 1985 ARCO group program as solid lines. Program proposed herein is generally designed to infill and to complete the 1984 GSI ANWR group program in which ARCO is a participant. The preliminary results of that activity indicate the subsurface geological structure of the coastal plain area is too complex to be reasonably interpreted on the basis of the six-by-twelve mile profile grid approved last year. While the approximately north-south east-west profile orientation proposed in the western coastal plain is appropriate for the structural configuration of that area, it may not represent the optimum orientation in the eastern coastal plain. Preliminary 1984 data from the eastern coastal plain are not available at this time and the preferred profile orientation in the area has yet to be determined. Any deviation from orientation depicted on the enclosed program map will be determined in cooperation with the Regional Director and identified in the Plan of Operation. Total program is not expected to exceed 760 miles requiring 85 to 100 days to complete.

Two seismic crews with supporting vehicles will enter the ANWR coastal plain near the mouth of the Canning River and/or from the sea ice along the coast. Crews will be deployed to geographically separated operational areas as determined by program priorities. Upon termination of the season's activities, all equipment will be removed to a location off the ANWR coastal plain.

If the additional information is deemed necessary by participants and by the FWS, concurrent gravity and shallow subsurface sampling programs will be provided. Personnel and equipment for these projects will be attached to the seismic field crews.

Fuel resupply will be by cat train along routes selected to minimize the potential for surface damage. Fuel storage sites along the coastline are being considered and, if utilized, will be identified following consultation with the Regional Director. These sites will be addressed in the Plan of Operation. Travel from fuel storage sites to field crews will be restricted as much as possible to those routes traveled by the crews during daily conduct of exploratory activities.

Note that this Exploration Plan addresses only the specifics of exploratory field activities proposed for the period from January through early May, 1985. This plan extends also to encompass any similar activities that may be necessary and proposed for the period ending May 31, 1986. Such activities will be essentially identical to those described herein, but can not be specifically described until assessments of the 1984 and 1985 programs are made and the need for a 1986 program established.

ITEM 5

DESCRIPTION OF EXPLORATORY METHODS & TECHNIQUES

Five tracked Vibroseis® units will be utilized on each of two crews to acquire reflection seismic data. This equipment allows operations to continue in more adverse weather conditions than do drills and is independent of drilling conditions which, when difficult, slow production rate. Risk of injury to personnel is reduced by the use of Vibroseis® also. Each crew will include two tracked recording vehicles to maximize production rate. Provision of the fifth vibrator unit and the second recording unit allows system redundancy necessary to continue operations during short term equipment failures.

The Vibroseis® reflection seismic technique utilizes a closely spaced group of five vehicle-mounted vibrator units moving along a line of traverse. At established intervals (usually 15 to 25 feet), the units are halted and connected to the earth's surface by means of retractable plates. Controlled frequency energy impulses are then transmitted into the subsurface. These impulses reflect from the subsurface strata and are received by small geophones connected to a seismic cable laid along the line of traverse. The reflected impulses are electronically transmitted to a vehicle-mounted recording unit where they are recorded on magnetic tape for subsequent processing and analysis. Recorded reflection travel times and knowledge of the geophone configuration allow the user to map the subsurface geologic structure beneath the line of traverse. Six second records will be acquired. Deeper information is not required and is of questionable reliability. A 96 or 120 channel recording unit will be utilized allowing up to sixty fold multiplicity.

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Two crews will be deployed to assigned areas of the coastal plain. Each will consist of approximately 28 to 31 vehicles, 15 support trailers, and 44 to 49 individuals, and will move almost daily to accompany current field operations.

Assigned to each seismic crew, should informational needs warrant, will be one vehicle-mounted drill rig and crew which will recover and collect samples from shallow test holes drilled at variable intervals along each seismic profile. Test hole spacing and depth will be determined from information needs and by equipment capabilities. Samples and cores from each test hole and driller's logs will be made available to the government, as will the results of any geotechnical, geological, and geochemical sample analyses performed for the group.

A substantial quantity of gravity data has been acquired across the coastal plain of the ANWR. If in the judgement of group participants and the USFWS these existing gravity data are inadequate, a two-person gravity party with vehicle and gravity meter will be attached to each seismic crew. Gravity values will be recorded at intervals of approximately one-quarter mile along each seismic profile.

Each crew will progress at a rate of 1.5 to 6 miles per day, depending upon topography, snow cover, weather conditions, and acquisition parameters. Survey markers will be removed behind each crew.

Travel routes adjacent to and within the coastal plain cannot be precisely defined but will be over ice when appropriate and through authorized corridors along and generally parallel to the seismic profiles, thus minimizing crossings of major rivers. Routes will be scouted and marked by Field Monitors when necessary and crew personnel will be provided appropriate instructions. Casual travel will be prohibited. Personnel will be provided pertinent information so as to avoid travel across Special Areas and protected sites.

ITEM 6

APPLICATION OF TECHNIQUES TO AVOID DUPLICATION OF EXPLORATORY WORK

Utilization of optimum acquisition and processing techniques and rigidly enforced quality control practices will maximize data quality, thereby minimizing the need to resurvey profiles and avoiding duplication of effort. Profile locations identified in this Exploration Plan are selected to complement data acquired by the 1984 GSI ANWR Exploration group. Locations are tentative, however, being based upon as yet incomplete results of that program. Final profile locations will be presented in November with the Plan of Operation by which time the 1984 data will have been analyzed in greater detail. The intent of the proposed program is to complete the 1984 program and to acquire additional data needed to evaluate areas of special interest.

Group participation also negates the need for duplicatory activity as competing interests share in the use of equipment, data, and information.

Some duplication of surface activity will be necessary where incomplete 1984 profiles will be continued by 1985 program. Depending upon the length of the recording offset, as much as three miles of surficial duplication may be necessary at each point of continuation to assure common subsurface coverage beneath that point. Seven such locations are proposed, but four are located along the Canning River where fish overwintering areas may preclude all activity.

Completion of the 1984 program in this area is desirable due to the area's proximity to well control and other seismic data on adjacent state lands. Consequently, we propose to duplicate approximately ten to fifteen miles of profiles ANV84-8 and AN84-8 which are now separated by a 3.75 mile gap due to proximity of fish overwintering areas. Such duplication, if allowed, might provide information about the relative effects of shothole and vibrator techniques. Evidence of surface activity in this area might be short lived, however, as a portion of the area is within the Canning River flood plain. Acquisition of this profile will be contingent upon an overwintering determination by the USFWS.

ITEM 7

WORK SCHEDULE

Upon approval of this Exploration Plan, ARCO, in cooperation with the Regional Director, will identify as accurately as possible all environmental, subsistence, cultural, and land title issues having any significant effect upon the proposed program. Technical specifications will be compiled and submitted to prospective contractors with bids due approximately July 1, 1984. A contractor will then be selected and the Plan of Operation will be formulated. The USFWS will be offered the opportunity to participate in the contractor selection process if deemed necessary.

Following instrument tests, environmental briefings, and surface inspections personnel and equipment will enter the northwest coastal plain in early January 1985, or as soon as adequate snow cover exists and the Canning River can be safely traversed. Survey crews will disperse to operational areas, followed by field crews. Field data acquisition will commence in each area on or about January 10, 1985, and will continue until program completion or until deteriorating surface conditions require removal of personnel and of equipment to a summer storage site(s) west of the ANWR. Special areas subject to surface restrictions will be traversed in compliance with Title 50 CFR §37.32 in order to avoid interference with indigenous biological and cultural values.

Data processing will begin immediately upon data acquisition and will continue until approximately August 1, 1985, when all final processed results of the program will be available. Raw data and preliminary and final processed data will be submitted to the Regional Director at regular periodic intervals and as available throughout the course of the program. This is to assure that as much information as possible can be included in the Secretary's Report prior to its submittal to Congress. Data interpretations will be available to the Regional Director in compliance with Title 50 CFR §37.53.

ITEM 8

COMMUNICATION NETWORK

A communications network will be designed by ARCO's telecommunications group in conjunction with the selected contractor(s). Commercially available satellite radio communication facilities, side-band radio channels between field crews and base camp, FM radio capabilities between field camps and vehicles, and VHF radio communication between all ground stations and supporting aircraft will be established and maintained. In addition, a radio-telephone link to provide additional direct communication between field crews, Deadhorse, and other locations outside of the program area will be established, if possible.

ITEM 9

EQUIPMENT, FACILITIES AND ACCESS

Approximately 28 to 31 tracked vehicles and 15 sled and/or track-mounted trailers will be assigned to each field crew. Trailers are towed in strings of two to eight units depending on weight and contents and are designed to provide subsistence, maintenance, and communication facilities for the approximately 44 to 49 individuals assigned to each crew. Each camp is self-sustaining for a period of ten to fourteen days and includes vehicles equipped with survival equipment. Additional accommodations and vehicles will be available for Field Monitors as deemed reasonable and necessary by the Regional Director. The following is a typical list of equipment used by each crew:

(A) VEHICLES

5	Tracked Vibrator Units
2	Tracked Recording Units
5	Tracked Cable Vehicles (5-man cab)
3	Tracked Survey Vehicles
1	Tracked Party Manager Vehicle (5-man cab)
1	Tracked Client Representative Vehicle (5-man cab)
1	Tracked Utility Vehicle (with boom)
5	Tracked Diesel Tractors
1	Tracked Water Tank Vehicle
1	Tracked Shop Maintenance Vehicle
1	Tracked Vibrator Maintenance Vehicle
2-3	Snowmobiles (utility)
1	Tracked Drilling Rig (optional)
1	Tracked Gravity Vehicle (optional)
28-31	Total

Field crews will be supported by either one or two fuel trains, depending upon the resupply plan selected. It may prove more efficient to utilize one small fuel train per field crew than to support both crews with a single large train.

(B) FUEL TRAIN(S)

1-2	Tracked Diesel Tractor(s)
4-6	Fuel Trailers
1-2	Survival Trailer(s)
6-10	Total

(C) CAMP EQUIPMENT

7	Sleeper-Office Trailers
1	Kitchen-Diner Trailer
1	Wash Trailer
1	Snow Melter Trailer
1	Incinerator Trailer
3	Fuel Storage Trailers
14	Total

The major support facility will be located at Deadhorse where a field processing and administrative center will be established. Communication and air support will be controlled from this facility. Medical support will be available at established Prudhoe Bay facilities and a certified medical technician will be present on each crew.

Except for the seasonal mobilization and demobilization of crews, access will be primarily by light aircraft to temporary snow airstrips near each camp. Fuel resupply will be the major exception in that fuel will be hauled overland from depot sites along the coast or west of the coastal plain. This phase of the program will be addressed in greater detail in the Plan of Operation after consultation with the Regional Director.

Each field crew will consist of approximately 44 to 49 individuals and every key field employee will be required to have previous arctic experience and arctic survival training. The following is a list of a typical crew complement:

FIELD CREW

1	Client Representative
1	Project Biologist (serves 2 crews)
1	Party Manager
1	Clerk
2	Observers
2	Junior Observers
1	Surveyor
1	Assistant Surveyor
2	Survey Helpers
5	Vibrator Operators
1	Vibrator Mechanic
13	Cable Helpers
2	Cable Repairmen
1	Mechanic
2	Mechanic Helpers
1	Cook
1	Cook's Helper
1	Camp Attendant
5	Tractor Operators
1	Driller (optional)
1	Driller's Helper (optional)
1	Geological Engineer (optional)
1	Gravity Meter Operator (optional
1	Gravity Party Chief (serves two crews, optional)
44-49	Total

ITEM 10

HAZARDOUS SUBSTANCE CONTROL & CONTINGENCY PLAN

Fuel and petroleum-based products constitute the major hazardous substances to be utilized in performance of this Exploration Plan. Offloading, storage, handling, and transfer will be in accordance with the requirements of 50 CFR §37.31(e)(1), (3) and (5). Prevention of fuel spills and leaks will be emphasized to personnel. Vehicles and equipment will be inspected and maintained to minimize the occurrence of fuel and hydraulic system leakage.

A Plan of Operation will be written in accordance with all appropriate regulatory requirements governing contingency plan content. A detailed Hazardous Substances Control and Contingency Plan (HSCCP) will be developed and submitted with the Plan of Operation. The following is a general discussion of the contents of the HSCCP, hereinafter referred to as Plan.

The Plan will contain three major sections. A general information section (1) will contain background information on the operation, type and location of activities, time periods covered, and the permittee's environmental compliance policy and commitment to prevent and properly respond to any and all spills. The Plan will contain information concerning required spill response and prevention equipment (2) which is to be located at the various activity sites, design criteria for the camp facilities operating equipment fuel storage sites, proper operating procedures for fuel transfer, and a description of the training to be conducted to assure implementation of the Plan. The spill response and notification procedures section (3) will include a response organization list of required persons/agencies to be immediately notified, cleanup and disposal procedures, environmental/cultural considerations, restoration, and required written reports.

ITEM 11

ANTICIPATED ENVIRONMENTAL IMPACTS - MITIGATING MEASURES

This Exploration Plan covers activities which will occur only during the winter months and it is anticipated that there will be minimal, if any, impact on the refuge's wildlife. By implementing the requirements of 50 CFR §37.31 as well as by utilizing the standard mitigating measures employed by the industry during many years of operating successfully on Alaska's North Slope it is anticipated that impacts to the environment of the Arctic National Wildlife Refuge (ANWR) will also be minimal.

ARCO plans to use established measures for which environmentally sound operations have been developed. These measures comply with existing regulations and are described in general terms as follows:

- Use of low surface pressure vehicles, travel over snow covered ground, prohibition of casual vehicle use.
- Vibrator units will be arrayed on or off profile in a manner designed to maximize protection of vegetative mat.
- Travel routes will be scouted, marked, and traversed as required by Field Monitors.
- Use of snow melters for camp water where approved surface sources are not available.
- Use of Alaska Department of Environmental Conservation (ADEC) approved greywater treatment systems and incinerators.
- Provisions for fuel spill prevention, containment and cleanup and use of double wall bladders and/or tanks.
- Establishment of procedures for garbage and waste control.
- Prohibition of feeding, harassing or taking wildlife.
- Protection of fish overwintering areas.
- Adherence to aircraft overflight restrictions.

Title 50 CFR §37.32(a) and (d) are not applicable as the proposed exploratory activities will not occur during the caribou calving and snow goose staging seasons.

The Sadlerochit Spring and Creek areas will be avoided in accordance with the requirements of 50 CFR §37.32(g). Exploratory work proposed in this plan will be completed in the identified muskoxen calving areas prior to the onset of calving season or under guidance of the USFWS Field Monitors, in accordance with the requirements of 50 CFR §37.22(b).

Brown bear, polar bear, and other identified denning sites will be avoided by rerouting traffic and seismic traverses in accordance with the requirements of 50 CFR §37.31(b)(11) and §37.32(c).

The Regional Director shall be provided with opportunities to conduct environmental and other pertinent briefings of the project personnel. Camp accomodations and vehicles shall be furnished for designated Field Monitors and other authorized representatives in accordance with the requirements of 50 CFR §37.42.

Winter exploration activities are expected to minimize potential conflicts with subsistence use. Additionally, potential conflicts of exploratory activities with subsistence will be minimized by project scheduling. ARCO will consult the Regional Director and others as necessary regarding winter subsistence activities.

The seismic survey lines, camps and fuel transfer sites will be located to avoid known archaeological sites identified by the Regional Director. Sites that could be impacted will be marked in advance if necessary. Sites discovered during exploration will be marked, reported and avoided. Since the vegetative mat will be frozen and snow cover adequate before vehicles are allowed on the coastal plain, impacts to undetected sites will be mitigated, as is consistent with the requirements of 50 CFR §37.31(d)(1) and §37.31(d)(2).

ITEM 12

MONITORING OF ENVIRONMENTAL IMPACTS

ARCO is fully committed to conducting the proposed operation in a manner which avoids significant adverse effects on the Refuge wildlife and habitat, and is satisfactory to the Regional Director. A number of steps will be taken to monitor the proposed activity to assure compliance with all regulatory and permit requirements.

ARCO will establish clear lines of authority to manage all aspects of contract work and services.

It will be the duty of every individual associated with the proposed activity to see that work is performed in an environmentally acceptable manner. It will be clearly understood by all company and contractor personnel that prudent operating and permit requirements must be observed.

ARCO will have overall responsibility for the proposed project and compliance monitoring. The actions of each individual crew will be directed and evaluated onsite by a Client Representative responsible to ARCO. Reporting to each of the Client Representatives will be a Party Manager whose major duties will include daily management and inspections. In addition, a Project Biologist knowledgeable of the area will be retained to review the Plan of Operation and provide assistance to ARCO, Client Representatives, and Party Managers. All will work closely with Field Monitors to assure that activities are conducted in an environmentally acceptable manner.

The following is a description of duties of the above identified positions in terms of project monitoring and compliance with all regulatory and permit requirements. The individuals to be assigned to these positions will be designated in the Plan of Operation.

Client Representatives. The Client Representative will be an individual qualified as a senior geophysicist with arctic field experience. Each will report directly to ARCO and will be responsible for directing and monitoring the activities of the particular crew to which each is assigned. The Client Representative will be thoroughly knowledgeable of all regulatory requirements contained in 50 CFR §37, the Special Use Permit Conditions and other federal, state and local laws, regulations and permit conditions applicable to the project.

Party Manager. Each crew will have a Party Manager whose major duties will be to directly supervise camp and field operations. A formal checklist will be developed and submitted in the Plan of Operation identifying potential problem areas associated with the camp, vehicles, fuel facilities, etc. This checklist will be completed, signed and submitted to the Client Representative daily. The Party Manager will monitor fueling and other fuel transfer operations to assure implementation of proper practices and procedures, and to assure that any spills are contained, cleaned up and reported to his Client Representative.

Project Biologist. The services of a Project Biologist knowledgeable of the area will be available to ARCO and the Client Representative of each crew on an as needed basis. The Project Biologist will coordinate with the Regional Director, his staff and Field Monitors and provide information and guidance to the project. As needed, the Project Biologist will monitor the project operations and bring to the attention of ARCO and the Client Representatives potential or existing problem areas. In addition, the Project Biologist will, upon completion of the program, survey the activity area and determine any necessary rehabilitation efforts required as a result of the program.

ARCO will assure, through monitoring procedures, that the operation's activities are in compliance with all regulatory and permit conditions. ARCO will:

(1) Assure compliance with regulatory and permit conditions applicable to the project by:

- Ensuring that all individuals are instructed as to ARCO's environmental compliance policy.
- Providing opportunities for the Regional Director to conduct environmental and other pertinent briefings to any and all personnel involved in field operations.
- Providing a copy of 50 CFR Part 37 to each employee involved with the proposed project in accordance with 50 CFR §37.33.
- Furnishing lodging, food and reasonable use of communications and surface/air transportation systems to the Field Monitors and other representatives identified by the Regional Director.
- Preparing and submitting progress reports to the Regional Director as prescribed. A synopsis of actions taken to assure compliance with regulatory and permit conditions will be included in the reports.

(2) Assure protection of biological resources by:

- Planing operations to avoid disturbance of fish overwintering areas, riparian willow stands and other sensitive areas identified by the Regional Director.
- Designing project operations in a manner that will not unduly harass wildlife or impede passage and movements of large mammals.
- Planning and monitoring the project to be consistent with any identified Special Area provisions.
- Submitting plans for rehabilitation of disturbed surface areas for approval to the Regional Director.

(3) Assure protection of cultural resources by:

- Planning operations to avoid archaeological sites identified by the Regional Director.
- Making the necessary arrangements to have cultural sites marked as directed by the Regional Director.

- Reporting to the Regional Director any cultural resources or materials discovered during the course of the project and providing steps to be taken to protect that resource/material pending evaluation by the USFWS.

(4) Assure implementation of the HSCCP and obtain approval from the Regional Director for the location of all fuel storage areas and temporary structures.

ITEM 13

STATEMENT OF INTENT TO COMPLY

ARCO hereby certifies that, if authorized to conduct exploratory activities on the coastal plain of the Arctic National Wildlife Refuge, the activities shall be conducted in compliance with the requirements of 50 CFR Part 37, the Special Use Permit, the approved Exploration Plan, Plan of Operation, and all reasonable stipulations, demands, and orders issued by the Regional Director of the USFWS.

ITEM 14

QUALITY CONTROL PROGRAM

ARCO and potential participants in the proposed program seek only to acquire quality data in a quantity and in a manner necessary to satisfy the requirements of the ANILCA. Under this proposal, the ARCO technical staff and participating companies will be responsible for designing and implementing the quality control program for data acquisition and processing. Primary responsibility for all aspects of the proposed activity will reside with ARCO.

Quality control standards and practices are well established by industry practice in the Arctic and little variance from the norm is anticipated. ARCO's intent is to require all major field instrument components to be of identical manufacture with identical characteristics. A complete inventory of spare parts and supplies will be maintained by field crews at the Deadhorse facility.

The geophysical system (vibrators, geophones, and recording units) will be field tested and calibrated to assure response similarity between field crew units. The field-testing will use identical source, receiver, and recording parameters. The field recordings will be field-processed, displayed, and analyzed on-site and initial parameters will be identified by ARCO Operations Coordinators expert in data acquisition technology. Field test records will then be transferred to a processing center for more detailed analyses and final acquisition parameters will be selected. ARCO Operations Coordinators and Geophysicists will regularly inspect all operations to ensure proper technical performance by contractor(s). Most importantly, ARCO personnel will supervise all significant field tests.

At the beginning of the season, crews will be deployed to areas of responsibility and, upon arrival, will conduct an independent systems check and field acquisition tests to verify that selected parameters are indeed appropriate for the operational area. This is to ensure that system performance remains within tolerances and that selected parameters are appropriate for local geological conditions. Should local geology require modification of selected parameters any parameter change will be documented relative to the initial systems test.

Diagnostic instrumentation tests will be recorded at specified intervals and analyzed and retained to monitor instrument performance. Complete and detailed records of system performance on a record-by-record basis will be maintained. Appropriate real time adjustments of the system components will be made to overcome the effects of wind, ice, and other deleterious influences.

The Client Representative assigned to each field crew will have primary responsibility to monitor data quality. He may require the crew to temporarily terminate data acquisition and to conduct recording and experimental tests to ensure that data quality remains acceptable and that system response remains within tolerances. Any variance exceeding established rigid tolerances at any test point will result in data acquisition shut-down until the problem is corrected.

Digital tapes containing raw data will be transferred regularly by aircraft to the Deadhorse support facility for quality control purposes and then transferred in three to seven day intervals to a processing center for final processing. The seismic data will be processed by the same contractor who conducts the seismic field survey to assure system and organizational compatability.

Processing geophysicists will critically analyze data quality throughout the processing phase in an attempt to produce the highest quality final product. Through testing procedures they will determine the processing parameters that respond best to the characteristics of the field-processed data. This will represent a second level of quality control.

All gravity data and geological samples acquired as a result of this program will be processed, analyzed, and interpreted by selected contractors other than the seismic contractor due to the unique characteristics of each discipline. Data and results will be distributed to program participants as requested and to the Regional Director pursuant to 50 CFR §37.53.

Finally, the raw data and processed and analyzed data and information will be transferred as appropriate to each participant for individual use. ARCO and participants may reprocess all or part of the data set through proprietary processing systems. These reprocessed data will be available to the USFWS under 50 CFR §37.53. This will represent a third level of quality control available to the Service.

The entire testing, acquisition, and processing quality control process will be carefully documented and this record will be available to the Secretary of the Interior pursuant to 50 CFR §37.52.

ITEM 15

OTHER PERTINENT INFORMATION

This Exploration Plan also includes "other pertinent information" that the Regional Director, in a letter dated 24 February, 1984, referenced by the USFWS as "PSS," asked to be added. This letter, received by ARCO February 29, 1984, requires the following additional items which are submitted herewith.

(1) A one-page (8½" X 11") map, suitable for publication, that depicts the information in 50 CFR §37.21(d)(4).

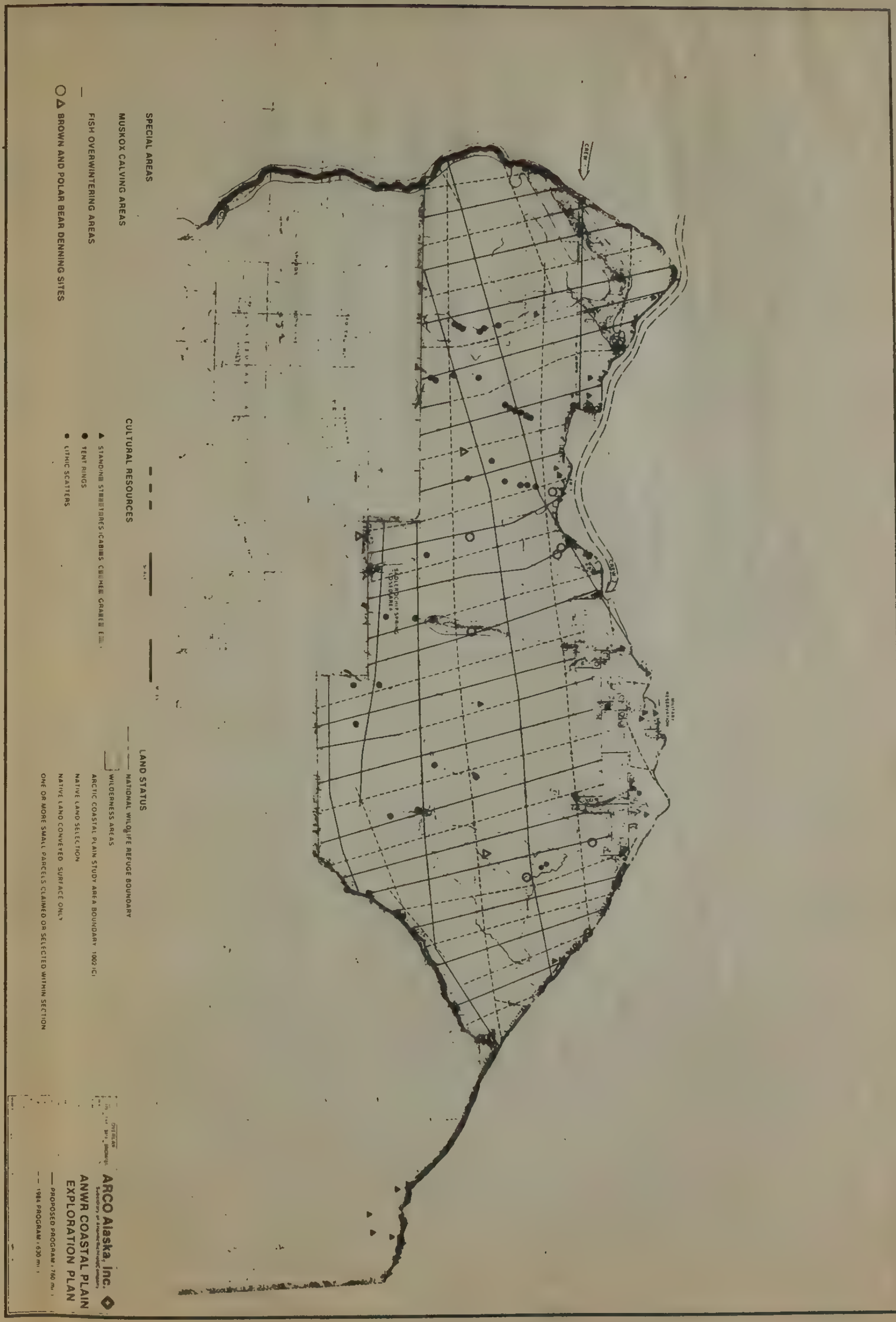
(2) A transparency of the 1:250,000 scale program map.

(3) One double-spaced copy of the Exploration Plan in addition to the three single-spaced copies previously required.

(4) A statement of consistency with the State of Alaska's coastal management program.

(5) A check in favor of the USFWS in the amount necessary to cover expected Exploration Plan review costs.

These five items are the only additional items that the Regional Director has requested prior to submission of the Exploration Plan. ARCO is prepared to provide any "other pertinent information" relating to this Exploration Plan as the Regional Director may reasonably require.


SPECIAL AREAS
MUSKOX CALVING AREAS
FISH OVERWINTERING AREAS
○△ BROWN AND POLAR BEAR DENNING SITES
CULTURAL RESOURCES
▲ STANDING STRUCTURES (CABINS, CACHES, GRAVES ETC.)
● TENT RINGS
● LITHIC SCATTERS
LAND STATUS
NATIONAL WILDLIFE REFUGE BOUNDARY
WILDERNESS AREAS
ARCTIC COASTAL PLAIN STUDY AREA BOUNDARY 1002(C)
NATIVE LAND SELECTION
NATIVE LAND CONVEYED SURFACE ONLY
ONE OR MORE SMALL PARCELS CLAIMED OR SELECTED WITHIN SECTION
ARCO Alaska, Inc.
ANWR COASTAL PLAIN
EXPLORATION PLAN
PROPOSED PROGRAM (760 mi.)
1984 PROGRAM (630 mi.)

EXPLORATION PLAN

CGG LAND SEISMIC
A DIVISION OF CGG AMERICAN SERVICES, INC

June 1, 1984

Dr. Robert E. Putz
Regional Director, Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Dr. Putz:

CGG American Services, Inc. (CGG) hereby applies for a special use permit to perform a group supported seismic survey during the time period between October 1, 1984 and May 31, 1986, on the Arctic National Wildlife Refuge (ANWR) coastal plain. We appreciate your consideration of our application and the attached exploration plan.

Sincerely,

Norbert Blot
District Director, Pacific Coast and Alaska

699 HAMPSHIRE ROAD
SUITE 203
WESTLAKE VILLAGE, CALIFORNIA
91361

805 496 4311
213 991 7060
TELEX. 182875

I. Purpose of Exploration Plan

CGG's submission of this exploration plan is based on the principle that the Public, the Fish and Wildlife Service (FWS), and the exploration industry will be best served by restoring competition between seismic contractors in the effort to evaluate the potential hydrocarbon reserves of the ANWR. Competition ensures exploration by highly motivated people using the best technology available in the most effective operations consistent with protecting the environment. It allows use alternate strategies whenever it is not possible to ascertain an optimum approach, and promotes a sense of fairness among all concerned with the project.

Simultaneous seismic surveys in the ANWR by different contractors raise three important issues: data uniformity, duplication, and monitoring. Uniform data can (and must) be obtained by proper selection of recording and processing parameters. Duplication of survey lines is environmentally unacceptable and is simply not necessary. Monitoring more than one contractor will require increased effort by the FWS, but the extra cost is small compared with the benefits of competiton.

Last year the FWS reviewed many exploration plans, several of which proposed similar survey grids, and approved, with revisions, one of those plans. The survey grid orientation is now established by the lines acquired. Additional reconnaissance data is needed for the required resource evaluation; maintaining the existing grid will conserve field effort and minimize the environmental impact.

II. Exploration Plan Application Requirements (50 CFR Part 37 Para. 37.21)

A. CGG has met with the Director, the former Regional Director, and other members of the FWS staff, discussing this and previous applications.

B. This plan is for the time period between October 1, 1984, and May 31, 1986.

C. General Plan Because last year's Record of Decision infers a possible rejection of all exploration plans which do not offer complete ANWR survey with a uniform grid, we here propose a complete infill survey. This is very similar to what we proposed last year, after adjusting for what had now been acquired. However, while CGG is fully capable of fielding two or three crews for the ANWR, we urge that no single contractor again be awarded a monopoly over this imporant survey area.

Explorationists generally believe a two mile by two mile grid will eventually be necessary to reduce the risk of completely missing important subsurface structures. Uniformly infilling the current six by twelve mile grid will yield a three by six mile grid which cannot be efficiently changed to a two by two mile grid. If a two by two mile grid is necessary, survey plans must accommodate it this year.

Final determination of the coming survey should await preliminary interpretation of the acquired data. Evidence of significant structure may require a small, detailed survey.

We suggest one 192-channel seismic recording crew for an infill survey of approximately 505 line-miles, and request 170-250 line miles in a designated area for the 1985 season. The remaining portion can be acquired by other contractors this season, or, if the FWS prefered, CGG would complete the survey in the 1986 season. We are able to provide two crews to complete the survey in the 1985 season, but urge that no contractor have a monopoly. It is premature to propose a detailed survey because the data is not yet available for interpretation. It is not in either industrys' interest nor in the FWS's interest for CGG to propose an alternate grid. It is the responsibility of the FWS and/of the Interagency Review Pannel to determine what grid should be recorded this coming season. Offering to the industry two or more overlapping grids could result in inadequate support for any survey. The way to reintroduce competition into ANWR exploration at this time is to allocate areas. The evidence is plain that industry will support the competition that would result in lower exploration costs, and reduce the probability that North Slope exploration would ever again be dominated by a single seismic contractor.

Vibrators are the proposed seismic energy source, but CGG will use the shothole method if the FWS and/or Interagency Review Pannel prefer. The environmental advantages of vibrators include eliminating blowouts, cratering, and the transportation and storage of explosives; fewer tracked vehicles (especially where wheel-mounted vibrators are useable); and localizing the crew personnel and activities. Operational advantages of vibrators include less sensitivity to adverse weather, easier and more localized logistics, ease of modifying the recording parameters when needed, and greater safety. While it is preferable to move the vibrators along the survey line, it is not always necessary. When recording 24-fold data with 192 channels, using 110' station intervals, the vibrators could deviate off-line, without vibrating, for 330' out of every 440'. It is easy to "make-up" skips or gaps with vibrators, and to increase the seismic energy input where doing so. Snow removal, where needed along the vibrators path, can be done using a scoop with a rubber skirt on the blade to protect the tundra. Large, double-wide wheels on buggy-mounted vibrators will reduce the need for snow removal and increase the tractive ability, reducing the need for tracked vibrators. Because maneuvering wheel-mounted vibrators is much less damaging to the surface than maneuvering track-mounted vibrators, there is greater freedom to avoid obstacles and sensitive areas.

If vibrators are used, CGG would provide five Mertz buggy-mounted vibrators with double-wide wheels, and substitute tracked vibrators only if conditions required their use. The vibrators would be equipped with force control units which prevent decoupling. Decoupling damages the tundra and degrades the data. Last winter CGG provided the first test of the force control system on the Slope, and after extensive experiments we determined that the elimination of decoupling was the single most important variable in improving data quality.

An important data-quality advantage of vibrators over conventional dynamite is reduced sensitivity to "frost breaks" or "ice breaks." Because the vibrators seismic energy output is distributed over a controlled time and frequency, the sensitivity to any noise which is distributed over a short time and a wide frequency is greatly reduced. An analogy is the ability to recognize speech or music "through" the random noise of radio static. By contrast, it is far more difficult to recognize a single handclap sound "through" radio static.

The Record of Decision (September 15, 1983) opposed vibrator use, but the Regional Director approved an exploration plan revision permitting limited use of vibrators near the ANWR coast, setting a precedent for vibrators in the ANWR. If CGG is permitted to use vibrators, we will upon request provide subsurface sampling capability to assist the geological interpretation.

We propose to record with 192 channels, using a Sercel SN 348 telemetric, computer-controlled recorder, to reduce the environmntal impact while obtaining high quality data. Higher multiplicity in recording allows each "shot" to be more effective. Obtaining more information about the subsurface structure from each "shot" allows the number of "shots" to be reduced without reducing the data quality. Depending on the needs indicated from the past survey, we could acquire 24-, 32-, 48-, or 96-fold data using 192 recording channels. We plan to use 110′ station intervals, as we proposed last year, and as were actually used for the ANWR data recorded. The maximun recording offset is approximately 10,000′, the same as CGG and most others have used for recent North Slope recording, and greater than the 6600′ used in the ANWR this past winter. All other parameters would be determined by extensive field tests and experiments prior to recording.

D. The following information requested by paragraph 37.21 (D), items 1-15:

1. The CGG officers responsible for these exploration activities are:

P. Benichou	Vice-President	1475 Lawrence St.	Denver,	CO	80202
N. Blot	District Director	699 Hampshire Rd.	Westlake Vlg.,	CA	91361
R. Whitsett	Asst. Dist. Mgr.	699 Hampshire Rd.	Westlake Vlg.,	CA	91361
H. Dickerson	ANWR Coordinator	5630 Silverado Way	Anchorage,	AK	99502

Pierre Benichou has 19 years with CGG. Norbert Blot did his Ph.D. studies at ENSEEHT in Toulouse and has 15 years with CGG. Bob Whitsett completed his Ph.D. in geophysics at Oregon State; has 14 years teaching and research with oil companies and 3 years with CGG. Howard Dickerson has 25 years of wide-ranging business experience and 4 years with CGG. Our Field Supervisors and Party Chiefs have bachelor level engineering or geology degrees and 5 years with CGG in Alaska.

Our Anchorage facility has 2000 square feet of office space and warehouse. In Deadhorse at the South Lake Inn we have 5000 square feet for office, data processing center, electronic and mechanical repair facilities, and warehouse; plus two acres of parking.

2. We expect at least 15 participants will support continued ANWR exploration.

3. CGG has operated in Alaska for five years, and for the past three winter seasons on the North Slope. We have acquired data for six different groups and several exclusive clients. During this past season we served the Prudhoe Bay Unit (Shoio operating) with the most intensive 3-D survey ever conducted on the North Slope. An 85-man crew was needed for this operation, and all of the equipment utilized exceeded the environmental requirements. Eight-line swaths of 60 stations each were recorded, requiring 480 channels. Over 75 square miles of coverage was obtained. The SN 348 proved to be capable down to temperatures of -50 degrees F.

Our second crew worked for two groups on the Beaufort north of the ANWR. Thirteen participants were in the Infill Demarcation Group, and fourteen participants were in the Kaktovik Lagoons Group; these two groups of participants were largely overlaping, sixteen companies total were represented. Every participant in our Groups was also an ANWR participant, and we have been told that our data quality meets or exceeds that obtained by the ANWR vibrator crew.

Our success in gaining wide participation in these groups is an indication of industry's desire to maintain contractor competition in Alaska. The Infill Demarcation Group was formed in direct competition with another proposed group in the same area. Until the competing group was absorbed into the ANWR Group, at less than one-half of its originally proposed cost, the Infill Demarcation Group received twice as many commitments. We do not claim that CGG received this wide industry support because we are superior; if CGG had received the only ANWR permit, no doubt the competing group would have obtained twice as many commitments as the Infill Demarcation Group. However, it seems unfortunate that the decision to use a one contractor for a two-crew operation in the ANWR led directly to a three-crew operation, with the third crew operating mainly outside the ANWR.

There is ample evidence of CGG's operational responsibility and compliance throughout its history in the Arctic. This includes permits and completion reports for seismic surveys in both north and south Alaska submitted to federal, state, local agencies, and business organizations (the BLM, USGS, MMS, DMEM (State of Alaska), the North Slope Borough, and others).

4. The attached map shows the approximate location of the proposed survey lines. The map should be viewed as tentative, to be adjusted in accordance with FWS experience from this past season. Final determination of the survey lines will take into account exact location of the previous survey, as well as restricted areas, and will be based on advanced reconnaissance by CGG with FWS representatives.

Fuel will be transported by cat trains using double-wall fuel tanks. Offshore routes will be used from Deadhorse to the Refuge, ice permitting, and then along those trails known from last season to be least sensitive to environmental damage, unless less sensitive new accesses can be found. Trails may be changed periodically if the net environmental damage is thereby reduced.

The crew camp will move on a daily basis, and be refueled once each week. Weekly deliveries of food and spare parts will be made directly to the crew using light, fixed wing aircraft, landing on ice or heavy snow cover to minimize surface effect.

5. We propose vibrators, alternatively dynamite, as the seismic energy source. Please see II. C also.

6. This exploration plan is limited to seismic reflection. If requested, CGG will augment the exploration activities to include borehole sampling, gravity measurements, and transient electromagnetic measurements (TEM). These were proposed in our plan for last year; TEM assists in determining permafrost thickness.

7. We propose to mobilize in early January, commence field operations approximately January 5th, and halt the operations when indicated, approximately May 15th, during both 1985 and 1986.

8. Communication Equipment and Technique:
   a. ALASCOM Mobil Earth Station Satellite telephone at crew camp.
   b. Existing telephone links in both Kaktovik and Deadhorse.
   c. SSB radios at crew and cat. camp, Kaktovik, Deadhorse, and fuel train.
   d. One-hundred watt field radios for field to crew camp communications

The primary communication link between the crew camp and our permanent Anchorage and Deadhorse offices will be via satellite telephone, which will handle either voice or data. Daily and weekly reports for both the FWS and group participants will utilize this channel, and it will be available to the Refuge Mamager's Office to assist in monitoring, passing operational or program status information, and for emergencies. SSB radios and multi-channel 100 watt radios will serve communication in the field, between the crew camp, cat camp, cat train, and field operations. and will also provide back-up communication for the satellite link.

9. Please see D. 4 above and Appendix "A" for description of personnel, equipment, facilities, and accesses.

10. Hazardous substance control will be provided by having absorbent materials present at all times when adding or changing fuel, lubricants, and hydraluic fluid. If an accidental discharge occurs, such as from a ruptured hydralic hose, the residue will be scrapped up and incinerated. Should a major spill occur, such as an overturned fuel tank, malfunctioning valve, or major line rupture, a snow berm or dike will be put around the spill to contain it for recovery and clean-up. Education of the crew in the important procedures necessary for proper handling of hazardous substances is given highest priority. Crew managment and fuel handlers are aware of the importance of following strict precautionary procedures, and the necessity of immediately reporting, both orally and in writing (on forms provided), all accidental discharges and spills.

11. Last year the Interagency Review Panel rated CGG's "Environmental Sensitivity" very low. While we understand how this occurred, we do not believe it reflects the actual facts. CGG is aware of the unusual sensitivity of the environment in the Arctic, and the importance of protecting it, especially in the Refuge. We will adhere scrupuluously to all of the regulations and requirments specified by the FWS to assure a minimun impact in the area. CGG will hire a contract environmentalist, selected by and reporting to the FWS. This person will assist the FWS monitors, and have the authority to direct CGG in preventing avoidable damage to the environment. We will scout the survey area with the FWS in advance, and will implement all of the protective procedures the FWS has found useful in reducing the risk of damage.

Prior to commencment of field operations, CGG will provide to the FWS a detailed description of all environmental regulations, requirements and anticipated problems, together with CGG's planned responses. After any additions or modifications made by the FWS, CGG field supervisory personnel will arrange a meeting with FWS personnel to discuss face-to-face the plans, modifications suggested in the planned actions to comply with each of the requirements and regulations, as well as to develop strategies for dealing with unexpected occurences. While in the field, the crew will provide an enviromental summary statment, on a line by line basis, reporting problems encountered, solutions utilized, and recommendations for future actions.

12. Please see 11 above.

13. CGG hereby promises to comply with all regulations and requirements now specified, or which may become specified, for conducting a seismic survey in the ANWR during the next two winter seasons. The proposed activity complies with the State of Alaska's approved coastal management program and will be conducted in a manner consistent with that program.

14. CGG's data quality assurance program provides monthly instrument tests, independant authority over the crew by a geophysicial supervisor, highly motivated and experienced field engineers, experienced processors, and an elected representative from the group specifically charged with data quality control. The data quality results of CGG's group surveys speak for themselves.

It is not necessary to maintain a single contractor, or a single seismic energy source, to obtain uniform data. The change from dynamite to vibrators is a more significant change than from one contractor to another, and the source change has already been implemented in the ANWR on a limited basis. If there were a choice, certainly all of the interested parties would prefer data improvement to data uniformity.

Obtaining uniform data is relatively straightforward. CGG has frequently reprocessed seismic data from two or more different contractors; occasionally even data recorded with widely different equipment, at different times, and with different sources; and produced matched results. While it is true that two different seismic surveys of the same area may yield dissimilar results, even if performed by the same contractor, it is equally true that the recording and processing parameters can be selected to give matched results, and this is done frequently. CGG uses "combination" crews in the lower 48 states which can record a single line, using vibrators where possible, then deep hole dynamite, and then shallow hole dynamite where helicopter support is necessary. These lines are then procesed as a single, matched line. It does require an extra effort, but a monopoly in the ANWR is not justified simply as a matter of convenience.

During the past three seasons CGG has served industry groups in winter surveys on the Beaufort ice north of the ANWR. The last two seasons there have been groups in the same area served by another contractor, and some of the participants have been in all surveys. Our processing center has been happy to hear that its processing has been generally quicker, with equal or superior quality. One respected, major oil company joined our proposed group this past winter primarily on the basis of our record of providing better, faster processing.

15. CGG will respond promptly to any requests by the FWS.

Conclusion

It may be asked why CGG is choosing this particular time to raise questions regarding the Record of Decision issued last September. We did appeal for a very limited 22.5 mile survey of the ANWR lagoons, but we did not take any action that could result in a delay in ANWR exploration. The process by which the ANWR became open to limited, carefully controlled exploration was long and arduous. Cooperation between various industry groups was important, and no one wanted to jeopardize the entire survey. However, now is the proper time to offer constructive criticism of the Decision.

While the goals of environmental protection, uniformity of data, and ease of monitoring were met by using a single contractor, the price was high. With the experience gained during the past seasons, it is evident that these goals can also be achieved using more than one contractor. CGG believes that the strong industry support shown for our groups north of the ANWR gives ample evidence that we are a deserving contractor for a portion of the onshore 1002 survey area.

APPENDIX "A"

Arctic Crew Equipment and Personnel

I. PERSONNEL

1.1 SUPERVISORY PERSONNEL

A) In Anchorage
- 1 Alaska Projects Manager
- 1 Geophysical Supervisor

B) In Deadhorse
- 1 Field Service Engineer
- 1 Expeditor

1.2 BASIC SEISMOGRAPH PARTY
- 1 Party Chief (Geophysicist)
- 1 Party Manager
- 2 Chief Surveyors
- 2 Surveyors
- 1 Observor
- 1 Junior Observor
- 4 Survey Helpers
- 1 Headlinesman
- 2 Chief Mechanics
- 12 Helpers (Recording Crew)
- 4 Line Drivers
- 4-5 Vibrator Operators
- 1 Service Manager
- 1 Camp Attendant
- 1 Cook
- 1 Cook's Helper
- 1 Cable Repairman
- Dozer Crew (Subcontracted)

A minimum total of 40-41 men in the field at all times, plus dozer crew. At least one of CGG's key crew personnel is a trained paramedic.

II. EQUIPMENT
- 1 Sercel SN 348 telemetric recording system with 6250 BPI tape transport, 192 channels, 2 ms sample rate
- 1 Sercel CS 2502 real-time full precision (32 bit) correlator-stacker
- 300 Field Telemetry Units
- 300 Cables
- 5400 GSC 20D winter base geophones, 8 Hz digital grade, two 9-geophone strings/trace
- 1 SIE 64 channel camera
- 4 Mertz "Universal" Model 18 vibrators, double-wheel buggy-mounted
- OR 5 Mertz Model 22 track-mounted vibrators (depending on area needs)
- 6 TI VSC III sweep frequency electronics with force control system
- 1 Fully-equipped 54-man sleigh camp with 18,000 gal. fuel, 500 gal. water
- 1 Vibrator repair shop on sleigh (total controlled environment)
- 1 Satellite communication system (from Anchorage to crew headquarters)
- 1 Satellite Positioning System (Doppler)
- 6 Beacons
- 2 Survey instruments, Distomat or equivalent
- 1 Cable repair kit: cable tester, shaking table, geophone tester, etc.
- 1 Ice check drill
- 1 Mayhew 1000 drill or equivalent (if requested for geologic sampling)
- OR 10 Mayhew 1000 drills or equivalent for shotholes if vibrators not used
- 1 Incinerator mounted on sleigh
- 5 SSB Radios
- 1 Recorder carrier, crew cab track-mounted diesel Nodwell 110 or equivalent
- 1 Vibrator tender, track-mounted diesel Nodwell 110 or equivalent
- 2 Survey vehicles, track-mounted diesel Nodwell 110 or equivalent

The following vehicles are track- or wheel-mounted (depending on area needs):
- 1 Party Manager crew cab vehicle
- 1 Headlinesman crew cab vehicle
- 2 Spare vehicles, one for FWS and Group representative
- 5 Line vehicles

Subcontracted
- 6 D-7 Dozers
- 1 Cat train with double-wall fuel storage capacity and survival unit
- Air support, fixed wing and/or helicopter

All vehicles are equipped with six-channel radios for intercrew communication

APPENDIX "B"

Recording Parameters

Energy Source: 4 Mertz 18's (Min. 3 operating) or 5 Mertz 22's (Min. 4 operating)
OR: conventional dynamite in shotholes

Cables and Geophones:
Number of groups: 192
Group interval: 110'
Geophones/group: 18
Receiver array length: 110'
Geophones strings/group: 2
Geophone frequency: 8 Hz

All other paramaters to be determined by extensive field tests and experiments.

Surveying: Satellite navigation system and Distomat EDM; line ends and intersections marked by removable, tagged rods for location in following season.

APPENDIX "C"

Processing

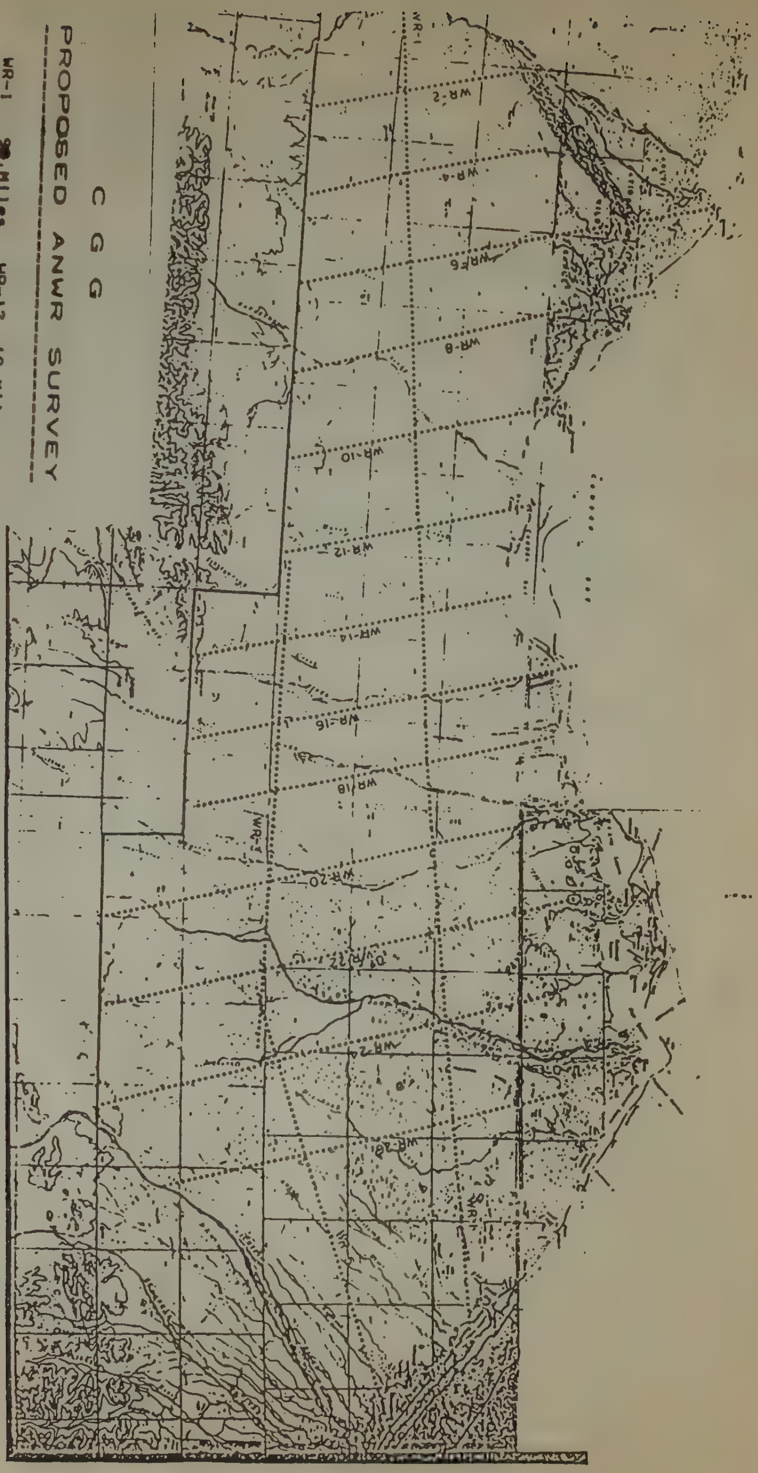
I. Basic Processing Sequence (Field sampling: 2 ms; processing: 4 ms)

1. Preprocessing
   - A. Demultiplexing, editing
   - B. Surface statics
   - C. CDP Gather
   - D. Brute Stack displayed on non-reproducible paper to be delivered to participants within two weeks of receipt of all field tapes and suppport data
2. Analysis Sequence
   - A. Velocity analysis
   - B. Normal moveout application
3. Final Processing
   - A. Deconvolution before stack
   - B. Stack
   - C. Time Variant Filter
   - D. Film Display
4. Post stack processing
   1. Post-stack deconvolution, coherency filter, and film display
   2. Wave equation or FK migration as group prefers, film display

II. Items to be furnished to each participant by CGG (scales determined by group)

1. Brute stack on non-reproducible paper
2. Final stack with automatic statics
3. Final stack with post-stack deconvolution and coherency filter
4. Migrated stack
5. Post-plot: final location map
   (Items 2 through 5 provided both on paper and reproducible mylar or sepia)
6. Copy of the 9-track navigation tape
7. Photocopy of the line-printer listing of the navigation tape file

Reproduction charges: at cost to each participant



C G G

PROPOSED ANWR SURVEY

WR-1	9[illegible] Miles	WR-12	19 Miles
WR-2	15	WR-14	23
WR-3	35	WR-16	28
WR-4	17	WR-18	26
WR-5	35	WR-20	31
WR-6	31	WR-22	35
WR-8	27	WR-24	34
WR-10	21	WR-26	30

Total: 505 Miles

EXPLORATION PLAN

June 4, 1984

CHEVRON

EXPLORATION PLAN

FOR

GEOPHYSICAL EXPLORATION PROGRAM

ARCTIC NATIONAL WILDLIFE REFUGE
COASTAL PLAIN

Chevron U.S.A. Inc.
Exploration Plan
Arctic National Wildlife Refuge - Coastal Plain
Geophysical Exploration Program

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INTRODUCTION

This Exploration Plan is submitted by Chevron U.S.A. Inc. ("Chevron") for the purpose of obtaining a special use permit to conduct seismic exploration of the Coastal Plain of the Arctic National Wildlife Refuge (ANWR), as defined by the Alaska National Interest Lands Conservation Act of 1980 (ANILCA).

This Exploration Plan will be the foundation of integrated exploratory activities which will accomplish the objectives of the United States Fish and Wildlife Service regulations as set forth in 50 CFR 37.1. These objectives include the attainment of the best possible data for ascertainment of the potential for further exploration, development, and production of oil and gas within the subject lands, and the prevention of significant adverse effects on wildlife and the environment. Unnecessary duplication of exploratory activities will be avoided.

Chevron is currently a participant in the industry program for seismic exploration of the Coastal Plain of ANWR which has been performed by Geophysical Service, Inc. Chevron's information obtained under this Exploration Plan will supplement the information obtained from the industry seismic program. The program proposed under this Exploration Plan (see map attached under 50 CFR 37.21(d)(4)) will encompass the entire Coastal Plain. This area contains complex geological structures (surveyed under the Geophysical Service, Inc. program) which can be further delineated under this Exploration Plan. In particular, the North to Northeastern portion of the Refuge contains complex structures which need to be more accurately delineated. Information obtained under this Exploration Plan will thus enable Chevron to more fully determine the potential for oil and gas production within the subject lands.

This Exploration Plan provides for two seismic crews with ancillary support vehicles to work one or two winter seasons in the Refuge, collecting Vibroseis (R)[1] seismic and gravity data. The second season may be needed to in-fill certain areas depending on results of the first season's work. While this Exploration Plan provides for use of the Vibroseis (R) technique, Chevron will utilize the conventional shothole/explosive technique if so required by the United States Fish and Wildlife Service.

Numbered Paragraphs 1 through 15 in this Exploration Plan are referenced to the corresponding numbered requirements of 50 CFR 37.21(d)(1)-(15), published as part of the final rules governing geological and geophysical exploration of ANWR, at 48 FR pp. 16838, et seq., April 19, 1983.

The seismic data obtained under this plan will be processed by the contractor that conducts the seismic field survey. (See discussion under Section 37.21(d)(1)).

Chevron further proposes under this Plan as part of its geophysical survey to obtain near-surface core samples (to a maximum depth of 100 feet) at one mile intervals along the proposed survey lines.

This Exploration Plan demonstrates (see discussion under 37.21(d)(4)-(6)) that activities proposed under this initial Exploration Plan will be integrated with any subsequent plan which may be filed.

[1] (R) Registered Trademark of Conoco Inc.

Chevron

Chevron U.S.A. Inc.
2120 Diamond Boulevard, Concord, California
Mail Address P.O. Box 8000, Concord, CA 94524

J. J. Anders
Manager, Alaska Division
Land Department, Western Region

June 4, 1984

Consistency Certification
Exploration Plan for
Geophysical Exploration Program:
Coastal Plain of the Arctic
National Wildlife Refuge

Dr. Robert E. Putz
Regional Director
U.S. Fish and Wildlife Service
U.S. Department of the Interior
Region 7
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Dr. Putz:

Chevron U.S.A. Inc. ("Chevron") herewith submits an Exploration Plan for a Geophysical Exploration Program to be performed on the Coastal Plain of the Arctic National Wildlife Refuge (ANWR) as defined by the Alaska National Interest Lands Act (ANILCA).

Chevron hereby certifies, to the best of Chevron's knowledge, that the proposed activities pursuant to this Exploration Plan comply with the State of Alaska's approved coastal management program and will be conducted in a manner consistent with that program.

Please advise if you need any further information relating to this certification.

Very truly yours,

J. J. Anders

ACM:jrg

Section 37.21(d)(1)

Section 37.21(d)(1) states as follows:

"The name and address of any person who will conduct the proposed exploratory activities, i.e., the applicant/permittee, and, if that person is an agency, firm, officials, or, if a partnership, the names and addresses of all partners";

The proposed exploratory activity will be conducted by CHEVRON U.S.A. INC., (hereinafter CHEVRON) a California corporation. CHEVRON's home office address is as follows:

CHEVRON U.S.A. INC.
2120 Diamond Boulevard
Concord, California 94520
Telephone: (415) 680-3333

CHEVRON's Alaska address is as follows:

CHEVRON U.S.A. INC.
3001 "C" Street
Anchorage, Alaska 99503
Telephone: (786) 786-6600

CHEVRON's officials responsible for the conducting of the proposed exploratory activity are as follows:

Mr. W. E. Crain
Exploration Manager
Western Region

Mr. E. K. Espenschied
Exploration Manager
Alaska Division

Mr. J. J. Anders
Land Manager
Alaska Division

Mr. R. R. Stevens
Division Geophysicist
Alaska Division

All of the above personnel are located at CHEVRON's Concord, California offices, the address of which is stated above.

Mr. Thomas Cook
Exploration Representative
Alaska Division

Mr. J. D. Bertino
Senior Land Attorney
Alaska Division

Messrs. Cook and Bertino are located in CHEVRON's Anchorage, Alaska office, the address of which is listed above.

CHEVRON will allow the United States Fish and Wildlife Service (USF&WS) to select the seismic contractor in order that the USF&WS will have control over the environmental aspects of the contractor's field operations. In the absence of selection by the USF&WS, CHEVRON will in all likelihood contract with one of the following two contractors to perform the seismic survey:

a. Geophysical Service Inc.
Box 225621, M/S 3970
Dallas, Texas 75265

(Alaska Address)
5801 Silverado Way
Anchorage, Alaska 99502
Telephone: (907) 563-3070

b. Western Geophysical Company of America
10001 Richmond Avenue
Houston, Texas 77041
Telephone: (713) 781-9600

(Alaska Address)
351 East International Airport Road
Anchorage, Alaska 99502
Telephone: (907) 563-3511

CHEVRON will engage the following subcontractor to perform a gravity and magnetics survey:

International Technology Ltd.
723 West Sixth Street
Anchorage, Alaska 99501
Telephone: (907) 278-1571

In past years, International Technology Ltd. has performed operations in conjunction with the following subcontractor:

Photogravity, Inc.
10615 Shadow Wood Drive
Houston, Texas 77043
Telephone: (713) 467-5865

Section 37.21(d)(2)

Section 37.21(d)(2) states as follows:

"The names and addresses of all persons planning at the time of plan submittal to participate in the proposed exploratory activities or share in the data and information resulting therefrom through a cost-sharing or any other arrangement";

CHEVRON submits this Exploration Plan on its own behalf. However, it is recognized that the Regional Director, USF&WS may decide to include other interested parties in the terms of a Special Use Permit, if granted.

Section 37.21(d)(3)

Section 37.21(d)(3) states as follows:

"Evidence of the applicant's technical and financial ability to conduct an integrated and well designed exploratory activities in an arctic or subarctic environment and of the applicant's responsibility in complying with any exploration permits previously held by it";

CHEVRON has both the technical and financial ability to conduct integrated and well designed exploratory activities in an arctic or subarctic environment.

CHEVRON's technical capabilities are evidenced as follows: CHEVRON employs a total of 158 people in the State of Alaska. CHEVRON employs approximately 1,200 professional exploration personnel worldwide. CHEVRON's technical staff has been long-recognized as a leader in geophysical and geological exploration. CHEVRON successfully completed geological studies in the Arctic National Wildlife Refuge to the satisfaction of Federal Authorities in 1958, 1959, 1960, 1962, 1963, 1964, 1965, 1968, 1970, 1975, 1977, 1978, 1979. Additionally, Chevron has successfully and to the satisfaction of State and Federal authorities completed the following permitted geophysical programs in the State of Alaska:

CHEVRON RECENT PROPRIETARY GEOPHYSICAL PROGRAMS

Year	Contractor	Permit Details	Location
1974/75	Western	ASRC	Central Arctic Foothills
1974/75	GSI		Central Arctic Foothills
1975/76	Western	FO & GEP 76-5 Navy RH/3165.1	Central Arctic Foothills
1977/78	Western	AK-026-0E8-001	Central Arctic Foothills
1979	Western	ASRC	Central Arctic Foothills
1979	Western	OCS-79-30	Beaufort Sea Ice
1979/80	Western	ASRC	Central Arctic Foothills
1980/81	Western	ASRC	Central Arctic Foothills
1981/82	Western	MLUP/NS 81-221 F-79718	Kavik Area
1981/82	Western	AK-026-N12-001	Umiat Area
1981/82	Western	F-79718	Ivishak Area
1982	Western	MLUP/NS 82-84	Milne Point
1984	GSI	USF&WS/84-C4	Kaktovik

CHEVRON OPERATED RECENT JOINT VENTURE GEOPHYSICAL PROGRAMS

Year	Contractor	Permit Details	Location
1974/75	Western	ASRC	Western Arctic
1975/76	Western	ASRC	Western Arctic
1976	Western	ASRC	Western Arctic
1976	United	76-3e	Beaufort Sea Ice
1979	Western	OCS 79-1 MLUP/NS 78-101	Beaufort Sea Ice
1980	Western	MLUP/NS 80-61	Prudhoe Bay Unit Area
1981	Western	MLUP/NF 81-52	Point Thomson Area
1983	Western	MLUP/NS 82-226	Colville Delta

CHEVRON OPERATED RECENT GROUP GEOPHYSICAL PROGRAMS

Year	Contractor	Permit Details	Location
1981	GSI		State Uplands
1982	Western	MLUP/NS 82-277	Beaufort Sea Ice
1983	CGG	OCS 83-01 MLUP/NS 82-173	Camden Bay Ice

CHEVRON further maintains an Environmental Affairs Department, a Public Affairs Department and employs various legislative and regulatory analysts to ensure consistant compliance with all State and Federal laws, regulations, and permit requirements.

CHEVRON's financial capabilities are evidenced by the following Consolidated Balance Sheet from the 1983 Annual Report of CHEVRON's parent company, Standard Oil Company of California.

Dollars in Millions	1983
ASSETS	
Current Assets	
Cash	$ 177
Marketable securities and cash investments	2,370
Accounts and notes receivable (includes amounts due from affiliated companies of $569 in 1982 and $1,040 in 1981)	3,067
Inventories	
Crude oil and products	845
Other merchandise	128
Materials and supplies	322
Prepaid expenses and other current assets	189
Total Current Assets	7,098
Long-Term Receivables	220
Investments and Advances	2,319
Properties, Plant and Equipment, at Cost	
Producing	13,527
Manufacturing	5,044
Marketing	1,770
Marine	1,318
Pipeline	641
Motor transport	119
Other	1,141
	14,232
Less: Accumulated depreciation, depletion and amortization	9,328
Deferred Charges	141
Total Assets	$ 24,010

Dollars in Millions	1983
LIABILITIES, DEFERED CREDITS AND STOCKHOLDERS' EQUITY	
Current Liabilities	
Accounts and notes payable (includes amounts due to affiliated companies of $208 in 1983 and $320 in 1982)	$ 3,362
Current maturities of long-term debt	46
Current maturities of obligations under capital leases	56
Federal and other taxes on income	1,301
Other taxes payable	352
Total Current Liabilities	5,117
Long-Term Debt, Less Current Maturities	1,008
Obligations Under Capital Leases, Less Current Maturities	888
Deferred Income Taxes	1,960
Deferred Credits and Other Noncurrent Obligations	852
Reserves-Employees Annuity Plans	79
Total Liabilities and Deferred Credits	9,904
Stockholders' Equity	
Common Stock-$3.00 Par Value Authorized-500,000,000 shares Issued-342,109,258 shares	1,026
Capital in Excess of Par Value	871
Retained Earnings	12,236
Total Stockholders' Equity	14,106
Total Liabilities, Deferred Credits and Stockholders' Equity	$ 24,010

Section 37.21(d)(4)

Section 37.21(d)(4) states as follows:

"A map at a scale of 1:250,000 of the geographic areas in which exploratory activities are proposed and of the approximate locations of the applicant's proposed geophysical survey lines, travel routes to and within the refuge, fuel caches, and major support facilities;"

The 1:250,000 scale map attached to and made a part of this Exploration Plan illustrates the approximate locations of the proposed geophysical lines.

The Exploration Plan calls for two seismic crews with ancillary support vehicles to work one to two winter seasons in the Refuge collecting Vibroseis (R) reflection seismic and gravity data. The program anticipated to be recorded in the first winter season, starting in January 1985, is shown by the solid lines on the program map. The referenced second season may be needed to in-fill certain areas depending on the areas completed during the first season.

A program for the 1985-1986 winter season may be required, depending upon the results obtained this season.

During the first winter season the travel route for the crew to the Refuge will be from Deadhorse to the vicinity of Camden Bay. The crews will then enter the Refuge and commence operations within the northwest area of the Coastal Plain. Upon termination of each season's activities all crew personnel and equipment will be removed to a location off the ANWR.

The fuel caches will be located at Camden Bay. Travel routes within the Refuge will be through restricted corridors adjacent and generally parallel to the geophysical program lines. Fuel caches will be identified after consulation with contractor(s) and the Regional Director and will be detailed in the Plan of Operations.

Major support facilities for the proposed program will be located outside of the refuge at Deadhorse.

The mobile camp will be initially located at Camden Bay, and will move offshore from a westerly to easterly direction as the work progresses.

Section 37.21(d)(5)

Section 37.21(d)(5) states as follows:

"A general description of the type of exploratory activities planned, including alternate exploratory methods and techniques if proposed, and the manner and sequence in which such activities will be conducted;"

Exploratory activities planned in the refuge involve the acquisition of Vibroseis (R) reflection seismic and gravity data utilizing tracked vehicles. A total of two seismic crew trains each consisting of approximately 23 vehicles, 15 support trailers and from 40-50 personnel will be utilized to acquire the proposed geophysical program. Each crew will be assigned to a separate area within the Coastal Plain and progress at an average rate of from 4 to 6 miles per day contingent on recording parameters, weathers, and topography.

The Vibroseis (R) seismic reflection techniques involves the use of 5 hydraulic vibrator units mounted on tracked vehicles. The units move in tandem along each geophysical survey line and are halted at established intervals (usually 110 feet to 220 feet) where they generate controlled frequency acoustic energy impulses. The energy impulses are transmitted into the earth's subsurface and then reflected back off the subsurface strata and recorded by geophones.

Electronic circuitry transmits the received reflection impulses through a seismic cable laid along the geophysical lines to a vehicle-mounted recorded unit where they are recorded on magnetic tape.

The magnetic tapes are them transmitted to a central processing center for subsequent processing and interpretation. Knowledge of the recorded travel times of the reflections and of the geometrical parameters of the geophone configuration allows the user to map the subsurface geologic structure beneath and adjacent to the line of traverse.

An advantage of the Vibroseis (R) technique is that the energy impulse from it is spread out over many seconds and will have a much lower amplitude level at the source then an impulse in which all the energy (i.e. - dynamite) is injected into the earth within a few milliseconds. This technique has been utilized successfully along the streets of large metropolitan areas in the United States and has been the standard of North Slope contractors since the mid 1970's.

Operating concurrently with each seismic crew (usually several miles behind it) will be a small 2 man gravity party supported by a single vehicle with survival equipment. A Lacoste-Romberg Arctic Gravity meter will be deployed at one sixth of a mile intervals along each seismic traverse and a reading of anomalies in the earth's local gravity field will be recorded. This gravity data together with the seismic data, when processed and interpreted, will assist the user in mapping the subsurface geologic structure and type of rock units beneath and adjacent to the line of traverse.

As stated in the Introduction to this Exploration Plan, Chevron requests permission hereunder to obtain near-surface core samples (to a maximum depth of 100 feet) at one mile intervals along the proposed survey lines.

In conjunction with geologic field studies which will be implemented independently, the program proposed in this Exploration Plan is considered sufficient to supplement the industry program and to provide the needed information to evaluate the hydrocarbon resource potential of the Coastal Plain.

Section 37.21(d)(6)

Section 37.21(d)(6) states as follows:

"A description of how various exploratory methods and techniques will be utilized in an integrated fashion to avoid unnecessary duplication of applicants own work;"

This Exploration Plan consists of an integrated approach involving field geologic, reflection seismic and gravimetric techniques to minimize duplication of work.

Contractor(s) selected to acquire geophysical data will (1) utilize industry accepted field instrumentation, (2) have demonstrated arctic experience and technical ability to complete the proposed program and (3) have a history of responsibility in complying with previously held North Slope exploration permits. These requirements, in conjunction with the utilization of optimum acquisition parameters and rigidly enforced quality control procedures, will minimize acquisition of poor data and the need to duplicate or resurvey geophysical lines.

As stated in the Introduction to this Exploration Plan, the geophysical lines proposed hereunder will supplement the program previously shot by GSI. There will thus be no duplication of proposed activity in the Refuge. As further stated in the Introduction, the Coastal Plain contains complex geological structures which can be further identified under this Plan. Execution of this Plan will thus enable Chevron to ascertain the best possible data and information regarding oil and gas potential in the ANWR, without significantly affecting the ANWR environment.

Section 37.21(d)(7)

Section 37.21(d)(7) states as follows:

"A schedule for the exploratory activities proposed, including the approximate dates on which the various types of exploratory activities are proposed to be commenced and completed;"

Personnel and equipment for the seismic and gravity crew planned for the winter season will be mobilized in Deadhorse in late January, 1985. The crew will enter the Coastal Plain in the vicinity of Camden Bay in late January/early February, 1985, contingent on adequate protective cover. The crew will disperse to assigned areas of operation and commence work after completion of final instrument checks and noise analysis tests.

Recording during the first season will continue until mid-to-late April or until deteriorating protective cover requires removal of the crew from the refuge.

Commencement dates for the tentative subsequent winter's geophysical operations will be contingent on demobilization sites for the crews and development of adequate protective cover.

Processing of data acquired from the proposed exploratory activities will begin almost immediately after start-up operations. It is anticipated that final processed data from the program for the preceding season will be available by early July of each year.

Weekly progress reports with respect to all operations and data processing activities will be furnished to the Regional Director.

Interpretations of the processed data will be made available to the Regional Director in compliance with applicable regulations.

Section 37.21(d)(8)

Section 37.21(d)(8) states as follows:

"A description of the applicant's proposed communication techniques;"

A variety of communication techniques will be utilized in the course of this activity. A communication network will be designed with the cooperation of the selected contractors and Chevron's telecommunication personnel.

Included in the communication techniques will be the following systems:

(1) FM radio communication between field camps and operating field vehicles;

(2) single side-band radio communication between field crews and major support facilities;

(3) commercially available satellite radio communication;

(4) air-to-ground radios between all ground stations and support aircraft; and

(5) provided permits can be obtained, radio phones will be operating via Kaktovik from the field crews to provide back-up and direct telephone communication.

Section 37.21(d)(9)

Section 37.21(d)(9) states as follows:

"A description of the equipment, support facilities, methods of access and personnel that will be used in carrying out exploratory activities;"

A seismic and gravity crew will consist of approximately 23 tracked vehicles, fifteen sled and/or track-mounted trailers (mobile camp) and a complement of 40-50 crew members. The crew train is entirely self-contained and capable of being moved every day. The crew is also capable of survival unsupported for up to two weeks in the event of isolation by weather. Every key employee will be required to have previous Arctic experience and Arctic survival training. As stated, the mobile camp will be initially located at Camden Bay, and will move along the offshore from a westerly to easterly direction as the work progresses.

A list of equipment and personnel comprising a typical field crew is given below:

PERSONNEL LIST FOR ARCTIC GEOPHYSICAL CREW

1 Party Manager
1 Administrator
1 Observer
1 Junior Observer
5 Vibrator Operators
4 Cable Truck Drivers
7 Recording helpers
1 Vibrator Mechanic
1 Chief Mechanic
2 Mechanic's helpers
2 Surveyors
3 Survey helpers
1 Camp Attendant
1 Gravity meter operator
1 Head Linesman
1 Cook
1 Cook's helper
6 Tractor Operators
2 Gravity Crew Personnel
1 Driller
1 Driller's Helper

EQUIPMENT LIST FOR ARCTIC GEOPHYSICAL CREW

5 Track mounted vibrator units
1 Tracked recording vehicle
1 Vibrator tender
1 Gravity personnel vehicle
4 Cable and geophone carriers
3 Survey vehicles
1 Party Manager's vehicle
1 Vehicle repair Shop
1 Client Representative vehicle

1 Incinerator mounted on sled
1 Camp utility vehicle with crane
6 D-7 Caterpillars
1 Drill

1 120 trace digital recording system, complete with ancillary equipment such as radios, recording units, input panels, electrostatic camera, tape transports, monitoring equipment, spare parts and all other equipment necessary for CDP recording.

1 Field computer

250 groups of 24 geophones each and necessary cables to serve all geophone groups at a group interval of 110, 165, or 220 feet. A geophone is to be mounted on each vibrator base plate.

1 50-man camp on sled, fully equipped for North Slope operations and full storage

1 Survival trailes for fuel haul unit

All required survey equipment such as syledis, theodolites, chains, rods, electronic distance measuring equipment, and marking devices.

Two-way radios, fire extinguishers, survival equipment, and first aid kits for all vehicles.

The major support facility, and Chevron's base of operations, will be located at Deadhorse, where a field processing and administrative center will be established. A description of facilities at Deadhorse to be utilized is as follows:

Base camp which provides subsistence and lodging for permanent and transient personnel;

Warehouse for parts and expendable supplies;

Maintenance shop;

Food storage;

Weather reporting service;

Year-round State owned and maintained airstrip;

Aircraft handling facilities;

SSB radio for communication with field crew;

VHF and CB radio communication;

Satellite telephone unit with Anchorage;

Instrument field service shop and personnel;

Cable and geophone string repair and test shop;

(Both Western and GSI maintain full service support and expediting centers at Deadhorse).

Excluding initial mobilization and end of the season demobilization, access to the crew will be by aircraft at temporary airstrips adjacent to the mobile camp at Camden Bay and by helicopter directly to the crew. Fuel supply may be a major exception in that fuel may be hauled over land from offloading sites along the coast or from other sites selected in compliance with applicable regulations.

Section 37.21(d)(10)

Section 37.21(d)(10) states as follows:

"A hazardous substances control and contingency plan describing actions to be taken to use, store, control, clean up, and dispose of these materials in the event of a spill or accident;"

This section will detail a hazardous substances control and contingency plan to be utilized in controlling, cleaning up, and disposing of hazardous substances in the event of spill or accident.

Both GSI and Western currently utilize extensive and proven hazardous substances control and contingency plans. Each company previously submitted a hazardous substances control and contingency plan for geophysical operations for the ANWR on May 20, 1983, as published at 48 Fed Reg, pp. 27944, et seq., and 27974, et seq., June 17, 1983, respectively.

Fuel and petroleum-based products will constitute the major hazardous substances to be utilized in performance of this Exploration Plan.

The crew will carry a total capacity of approximately 6,000 gallons of fuel in a sled-mounted tank. The crew will maintain a minimum of four days supply of fuel at all times.

If a tank has ruptured, all remaining fuel will be pumped into other fuel storage tanks. The contaminated area will be thoroughly contained and cleaned. In the event of a larger spill, or if an entire tank or tank car should overturn, ice and/or snow berms will immediately be constructed to contain any flow of fuel to the surrounding environment. Any contaminated snow, absorbent or loose material will be picked up and burned in an incinerator or an approved area.

The following is a typical industry daily check list for fuel storage facilities:

Daily Check List for Fuel Storage Facilities

A. Site Location ______________________________

B. Date ______________________________

c. Site Condition

______ Excellent ______ Good ______ Fair ______ Poor

Remarks ______________________________

E. Dike and Liner

______ Satisfactory ______ Unsatisfactory

Remarks ______________________________

F. Tank

______ Satisfactory ______Unsatisfactory

Remarks ______________________________

If a spill occurs, the following procedure is instituted:

1. Crew Member: Detects spill, notifies party manager.
2. Party Manager: Initiates containment and clean-up effort; mobilizes all personnel and equipment required; notifies Deadhorse base of operations.
3. Deadhorse base of operations: Notifies State of Alaska, Department of Environmental Conservation, preparation of written spill report.
4. Submission of written spill report to State of Alaska, Department of Environmental Conservation and any other Federal, State of local agency as required by law. Provide for additional information as requested by any such agency.

A typical industry spill report form requires the following information:

1. Reporting Company
2. Incident Location
3. Time of Day and Date Spill Occurred
4. Material Spilled
5. Estimate of Spill Volume
6. Present Location of Spill (Describe any movement of spill)
7. Environmental Conditions
8. Barge/Vessel Data
9. Cause of Spill (i.e., mechanical, design defect, operator error, etc.)
10. Actions Taken to Combat Spill
11. Estimated Clean-up Costs
12. Federal, State or Local Agencies Notified
13. All Other Personnel Notified
14. Signature of Reporting Official

Section 37.21(d)(11)

Section 37.21(d)(11) states as follows:

"A general description of the anticipated impacts that the proposed exploratory activities may have on the refuge's wildlife, its habitat, the environment, subsistence uses and needs, and cultural resources, and a description of mitigating measures which will be implemented to minimize or avoid such impacts;"

The purpose of this section is to set forth a general description of the anticipated impacts that the proposed geophysical activities may have on the subject area's wildlife and environment.

The proposed contractors, Western and GSI, have extensive experience conducting geologic and geophysical activity in the arctic. Each company is acutely aware of the necessity to avoid, minimize, or mitigate any impacts to the environment from such activities, however small. Each company has submitted a detailed plan analyzing the potential affects of geophysical activities, and a description of all avoidance, minimizing, and mitigating measures, pursuant to Section 1002 of the Alaska National Interest Lands Conservation Act (ANILCA) for exploration of the Coastal Plain of the Alaska National Wildlife Refuge ("ANWR"). (See 47 Fed Reg., pp. 27974-27984, pp. 27944-27960, June 17, 1983, respectively).

The foremost impacts to the environment within the subject area will be as follows: (1) surface disturbance; (2) withdrawal of water; (3) human presence and noise; and (4) solid waste disposal. A discussion of each of these areas is as follows:

1. Surface Disturbance

Surface travel under this Plan of Operations will occur from February, 1985 to no later than May 1, 1985. The snow cover during this period is sufficient to prevent significant adverse harm to the environment. All surface travel will take place on snow covered trails and frozen ground. Deep snow may necessarily be removed to a depth of approximately six inches for the placing of geophones which may be placed near the ground surface. Insignificant compaction of tundra will occur because of the protection from snow cover.

Harm or damage to stream and lake banks will be avoided by close coordination of crossings with the State of Alaska Department of Fish & Game. This will further prevent erosion of stream bank or siltation of streams or lakes.

Damage to low shrubbery and other vegetation will be insignificant. Any such vegetation harmed by moving crew vehicles will naturally recover.

2. Withdrawal of Water

A camp snow melter will be available to provide the camp water supply. Water will not be taken from streams or rivers. Lake water will only be taken from lakes without fish. There will thus be little or no impact on marine life as a result of operations performed under this Exploration Plan.

3. Human Presence

Slight impact to the environment may occur as a result of noise emanating from the mobil crews. Such noise will cause only minimal disturbances to birds, mammals, and other wildlife. Vehicle noises generally cause larger mammals such as caribou and musk oxen to move away short distances. Such noise will not affect the eating habits or migration of these animals. All seismic crews will avoid herds of animals whenever feasible.

Bird species such as snow owls and hawks may experience temporary disturbance. Again, any such disturbance will be minimal and for a very short duration. No lasting disturbance or harm to local bird species as a result of the existence of the crews is anticipated.

4. Solid Waste Disposal

All combustible waste products will be incinerated in approved receptacles such as burn baskets. Human wastes will be disposed of through use of electric incinerating toilets, which will reduce sewage to ash suitable for safe transportation to approved dump sites. Waste water on Refuge lands will be collected, containerized and back-hauled to approved dumpsites. Solvents and other substances will be containerized and taken back to the base camp for ultimate disposal at approved dumpsites. No significant environmental harm is anticipated as a result of the disposal of soild waste pursuant to activities performed under this Exploration Plan.

In addition to the four basic concerns addressed above, the following precautions will be taken:

(1) To prevent disturbance of wildlife, concentrations of caribou, muskox, red birds, and any other wildlife will be avoided. Contact with or harassment of wildlife, even if unintentional, will be recorded.

(2) All field party members will take special care to minimize the disturbance when any wildlife is encountered. No hunting, fishing, trapping, or feeding of wildlife will take place under any circumstances.

(3) Polar bear and brown bear denning sites will be avoided by rerouting traffic and seismic traverses in accordance with the requirements of 50 CFR 37.21(b)(11) and 37.32(c).

(4) Cultural and archaeological sites, and other sensitive areas, will be identified prior to operations and avoided.

Section 37.21(d)(12)

Section 37.21(d)(12) states as follows:

"A description of the proposed procedures for monitoring the environmental impacts of its operation and its compliance with all regulatory and permit requirements;"

Chevron is committed to implementing and performing the proposed Exploration Plan in a manner which will result in negligible adverse impact on the Refuge wildlife and habitat. The proposed operation will be conducted in a manner satisfactory to the Regional Director. Monitoring of the proposed activity by both Chevron and the USF&WS Service will assure compliance with all applicable Federal/State laws, regulations and permit conditions. Chevron welcomes the USF&WS monitor or monitors for the program, and all accomodations for such monitor(s) will be provided.

It will be the duty of every individual associated with the proposed activity to see that the job is performed in an environmentally acceptable manner. It will be clearly understood by all company and contractor personnel that wanton or reckless disregard of regulatory, permit and/or operating requirements will not be tolerated.

Chevron will establish and maintain clear lines of authority and responsibility for management of all aspects of contract work and services. Monitoring the environmental compliance responsibilities will be key, accountable job elements of the job description of the employees assigned to the proposed project.

Chevron will maintain overall responsibilities of the proposed project and compliance monitoring. A general representative or Project Manager will be designated and will be the person primarily accountable for managing the proposed project (37.12(b)). The actions of each individual crew member will be directed and evaluated onsite by a Client Representative who will report directly to the Project Manager.

Reporting to each of the Client Representatives will be a Party Manager whose major duties will include daily monitoring and inspections. In addition, a Project Biologist knowledgeable of the area will be retained to review the operations plan and provide assistance to the Project Manager and the Client Representatives.

Described below are the duties of the Project Manager, the Client Representatives, the Party Managers, and the Project Biologist in terms of project monitoring and compliance with all regulatory and permit requirements. The individuals to be assigned to these positions will be designated in the Plan of Operations.

Project Manager

The Project Manager will have overall authority for directing the proposed project. This person will have the responsibility to assure, through monitoring procedures, that the operation's activities are in compliance with all regulatory and permit conditions. The Project Manager will be the Regional Director's point of contact concerning project monitoring, compliance orders, notifications and service requests.

The Project Manager will:

1. Ensure that all individuals are instructed regarding Chevron's environmental compliance policy, and the regulatory and permit conditions applicable to the project.
2. Provide opportunities for the Regional Director to conduct environmental and other pertinent briefings for any and all personnel involved in the field operations.
3. Provide a copy of 50 CFR part 37 to each employee involved with the proposed project.
4. Furnish lodging, food and use of communications and surface/air transportation systems to the Service Field Monitors and other representatives identified by the Regional Director.
5. Plan operations so as to avoid movement of equipment through riparian willow stands.
6. With input from the Project Biologist, submit for approval to the Regional Director plans for rehabilitation of disturbed surface areas.
7. Assure that the project operations are being conducted so as not to harass wildlife.
8. Through consultation with the Project Biologist, assure that project operations are not unduly impeding passage and movements of large mammals or fish, or disrupting fish spawning, overwintering or nusery areas.
9. Plan operations to avoid restricted or prohibited archeological sites that have been identified by the Regional Director.
10. Report to the Regional Director any cultural resources or materials discovered during the course of the project and ensure that steps are taken to protect that resource/material pending evaluation by the USF&WS.
11. Make the necessary arrangements to have standing or substantial above-ground remains marked as directed by the Regional Director.
12. Ensure that all oil or hazardous substance spills are contained, cleaned up and reported as prescribed by the approved hazardous substances control and contingency plan.
13. Obtain approval from the Regional Director for the location of all fuel storage areas and temporary structures (i.e. ice airstrips).
14. Plan and monitor the project to be consistent with Special Areas provisions.
15. Ensure that project activities are not planned or conducted within the prescribed distances of the Sadlerochit Spring and Creek area.
16. Prepare and submit every other week to the Regional Director progress reports as prescribed. A synopsis of monitoring actions taken to assure compliance with regulatory and permit conditions will be included in the reports.
17. Be thoroughly knowledgeable of all regulatory requirements contained in ANILCA, 50 CFR part 37, the Special Use Permit conditions and other Federal, State and local laws, regulations and permit conditions applicable to the project (Chevron will pepare a reference document containing this information for use by the Project Manager, the Client Representatives, and the Party Managers).

Client Representatives

If the USF&WS selects a Client Representative, that decision will be followed by Chevron. If the USF&WS does not select a Client Representative, a Client Representative will be a Chevron employee qualified as a senior geophysicist with field experience. The Client Representative will report directly to the Project Manager and will be responsible for directing and monitoring the activities of the particular crew to which each is assigned. The Client Representative will be thoroughly knowledgeable of all regulatory requirements contained in ANILCA, 50 CFR part 37, the Special Use Permit Conditions and other Federal, State and local laws, regulations and permit conditions applicable to the Project.

The Client Representative will:

1. Address and attempt to resolve all problems and potential problem areas brought to his attention concerning his crew's operations.
2. In conjunction with camp safety meetings, present appropriate topics and information so as to develop and maintain an environmental awareness within the field personnel.
3. Monitor vehicle operations to assure that the vegetative mat or soil is not significantly damaged or displaced. Should damage occur, the Client Representative will document location and assessment information for use by the Project Manager, the Project Biologist and the USF&WS to identify possible rehabilitation needs.
4. Locate camp site locations and monitor proper housekeeping and clean up efforts.
5. Monitor gray water discharges to assure proper treatment.
6. Minimize wildlife harassment by assuring appropriate distances are maintained by vehicles and aircraft.
7. Properly manage garbage so as not to attract wildlife, and prohibit the feeding of wildlife by personnel.
8. Execute stream crossings so as to minimize effects on banks, fish migration, overwintering, spawning areas, etc.
9. Ensure that water is being obtained by approved methods.
10. Maintain vehicle and camp prohibitions through known cultural and archeological/resource sites and other sensitive areas.
11. Report to the Project Manager any cultural resources or materials discovered during the course of the project and ensure that steps are taken to protect that resource/material until it can be evaluated by the Service.
12. Ensure that previously marked standing or substantial above-ground remains are avoided by crew operations.
13. Make proper notification of all spills or leaks of hazardous substances, fires, injuries, fatalities, etc.
14. Properly dispose of all solid waste.
15. Contain, control and clean up spills of hazardous substances in accordance with approved hazardous substance control and countermeasure plans.
16. Properly locate fuel storage areas.
17. Take reasonable precautions to protect geodetic land survey monuments and report to the Project Manager any monuments disturbed.
18. Maintain the prescribed distance from the Sadlerochit Spring and Creek area.

19. Submit to the Project Manager every other week information required for the Progress Report including information regarding compliance monitoring actions. The Client Representative shall be thoroughly knowledgeable of all regulatory requirements contained in 50 CFR part 37, the Special Use Permit Conditions and other Federal, State and local laws, regulations and permit conditions applicable to the Project. (Chevron will prepare a reference document containing this information for use by the Client Representatives.)

Party Manager

Each crew will have a Party Manager whose major duty will be to routinely inspect camp and field operations. A formal checklist will be developed, and submitted in the Plan of Operations, identifying potential problem areas associated with the camp, vehicles, fuel caches, etc. This checklist will be completed, signed and submitted to the Client Representative daily. The Party Manager will monitor fueling and other fuel transfer operations to assure implementation of proper practices and procedures, and to assure that any spills are contained, cleaned up and reported to the Client Representative.

Project Biologist

The services of a Project Biologist knowledgeable of the area will be available to the Project Manager and Client Representatives whenever needed. When directed, the Project Biologist will coordinate with the Regional Director, his staff and Field Monitors and will provide information and guidance to the project. As needed, the Project Biologist will monitor the project operations and bring to the attention of both the Project Manager and the Client Representative potential or existing problem areas.

In addition, the Project Biologist will perform the following specific services:

(1) Recommend routes through riparian willow stands that cannot be avoided.
(2) Inspect and document disturbed surface areas and recommend rehabilitation methods to the Project manager.
(3) Aid crews working in potential bear denning areas to assure that dens will not be disturbed.

Section 37.21(d)(13)

Section 37.21(d)(13) states as follows:

"A statement that, if authorized to conduct exploratory activities, the applicant shall comply with this part, its special use permit, its approved exploration plan, plan of operation and all reasonable stipulations and orders issued by the Regional Director."

CHEVRON hereby states that CHEVRON, if authorized to conduct exploratory activities, shall comply with all of the regulations under 50 CFR part 37, the special use permit, the approved exploration plan, the plan of operations, and all reasonable stipulations , demands and orders issued by the Regional Director.

Section 37.21(d)(14)

Section 37.21(d)(14) states as follows:

"A description of the applicant's proposed data quality assurance and control program;"

A data quality assurance and control program will be ongoing throughout the exploratory activities proposed in this Exploration Plan. Rigid quality control standards and tolerances for Vibroseis (R) seismic reflection and gravity data acquisition (which are well established by industry practice in the Arctic) will be incorporated in any agreement with contractor(s) selected to acquire the proposed geophysical program.

Prior to the initiation of any field geophysical data acquisition the geophysical system (vibrators, geophones and recording units) will be field tested and calibrated to assure proper compatibility between field crew unit. A Chevron quality control engineer will also conduct an independent system analysis to insure that the data acquisition equipment meets all industry standards.

A Client Representative will be assigned to each seismic crew to assure adherence to quality control standards. On the basis of these standards the client representative may require the crew to temporarily terminate data acquisiton, repair equipment and/or take other steps as necessary to insure that acquisiton parameters remain acceptable and that system response remains within tolerances.

Selection of field recording parameters will be made following analysis of initial field recordings and noise analysis tests. Recording parameters are not expected to vary significantly from those used in recent years elsewhere on the North Slope; however, independent systems checks and noise tests will be conducted periodically through the season to verify that selected recording parameters are appropriate for each area of operation. This in conjunction with data processing analyses which will be completed in a central data processing center will determine if local geologic conditions warrant modification of selected recording parameters during the season.

Chevron's Geoscience Division will schedule initial and periodic tests of seismic instruments, survey and other field equipment to maintain high quality tolerance. Standardized instrument tests will be recorded on a daily, weekly and monthly basis and retained to assist in monitoring instrument performance and to assist in insuring that system performance remains within required tolerances.

Additional quality control will be accomplished by processing geophysicists when digital tapes containing raw data are transferred to a central processing center for final processing. A final phase of quality control will be accomplished by the interpreters who will utilize the data to prepare a subsurface geologic interpretation.

The paramaters used to process the data will be similar to those set forth in the state of the art processing sequence submitted by Geophysical Service, Inc. (GSI) as part of GSI's approved survey on the Refuge in 1984. These parameters are specifically delineated at 48 Fed. Reg. P. 27958, June 17, 1983.

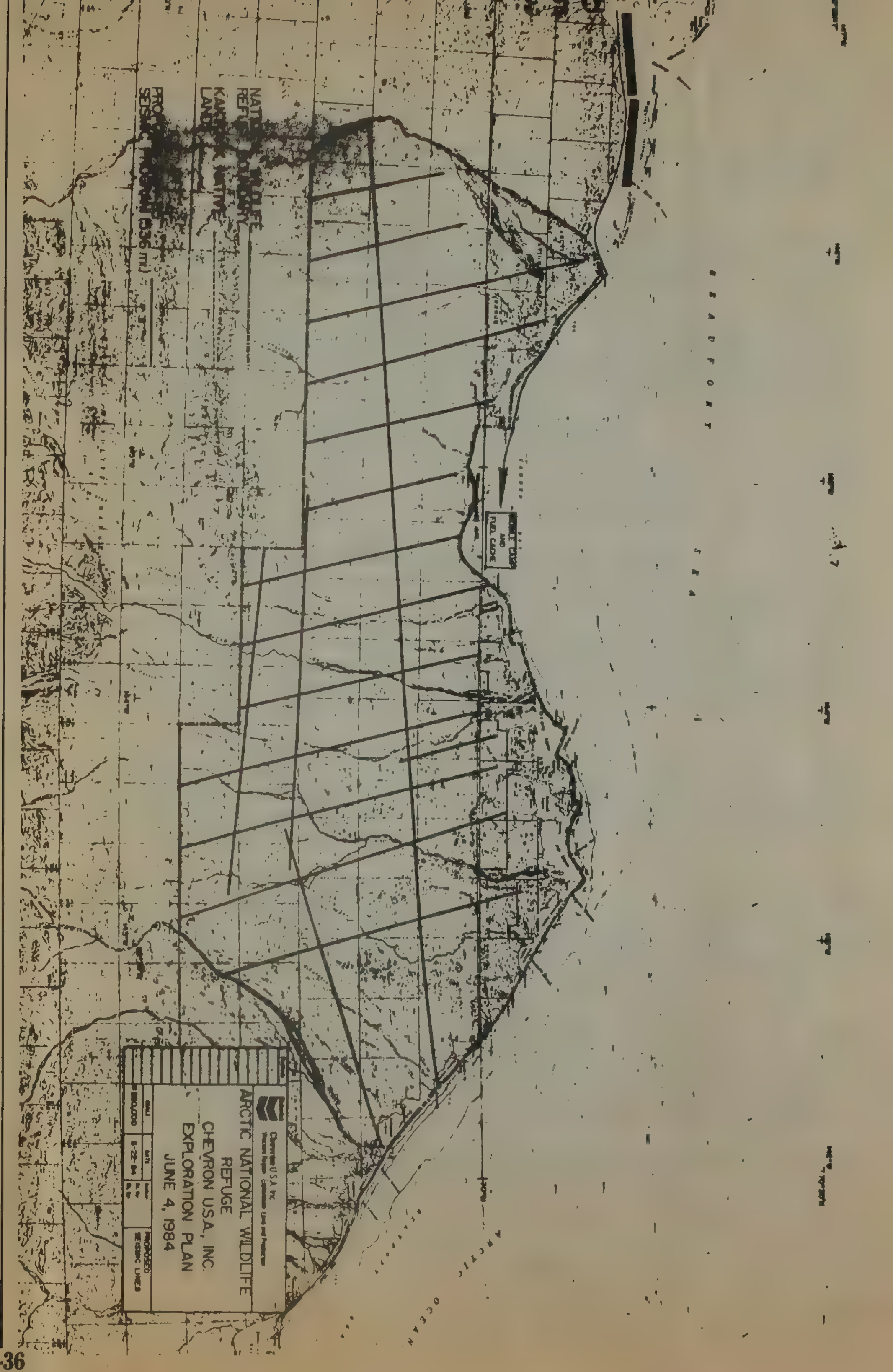
The entire testing, acquisition, and processing quality control process is documented and this record will be available to the Secretary pursuant to applicable regulation.

Section 37.21(d)(15)

Section 37.21(d)(15) states as follows:

"Such other pertinent information as the Regional Director may reasonably require."

CHEVRON will submit any further information required by the Regional Director.



REVISION REQUEST

GEOPHYSICAL SERVICE INC.
5801 SILVERADO WAY • ANCHORAGE, ALASKA 99502
907-563-3070 • TELEX 25-256

4 June 1984

Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

ATTN: Oil, Gas and Minerals Specialists (AWR/PSS)

Dear Sir:

As provided by 50 CFR 37.25 (a), Geophysical Service Inc. (GSI) requests permission from the Regional Director to revise our approved exploration plan for the Section 1002 study area of the Arctic National Wildlife Refuge (ANWR). The revision requested is for permission to change the energy source from dynamite to vibrators.

This is a substantial change from the operations presently approved in the exploration plan. We held three meetings with our client group of twenty-three (23) companies to discuss the form and content of this revision request and would now approve of this request being published so that hearings can be held for public comment.

The decision to change from dynamite to vibrators is not an easy one to make. It can be simplified by considering it within the framework of the Regional Director's Record of Decision dated 15 September 1983 and GSI's experience this past winter season. The Record of Decision provides a summary of the goals and expectations for the exploration as well as initial concerns regarding the use of vibrators. GSI's experience this past winter season provides insights to improvements that may be implemented in the exploration next year.

RECORD OF DECISION

The Regional Director separates the objectives of this program into three distinct parts. Firstly, the best possible data should be acquired. Secondly, the data should be obtained without significantly adversely affecting the environment, and thirdly there should be no unnecessary duplication of activities. He states that the higher the level of activity on the coastal plain, the greater the chance that significant adverse effects might occur, noting that the higher the level of regulatory control, the smaller the chance that significant adverse effects might occur.

Appendix 3 of the Record of Decision discusses expected or typical operations for the dynamite crews. It mentions that the cat-trains (main camps) are generally considered to be the most "damaging" component of the crew's operation.

A SUBSIDIARY OF TEXAS INSTRUMENTS INCORPORATED

1984 GSI EXPERIENCE

GSI operated two conventional dynamite crews and one vibrator crew on the ANWR this past winter season for a total of nine (9) crew months. There were 607 miles of conventional shothole seismic data collected along with 153 miles of vibrator data. Forty (40) of the 153 miles of vibrator data duplicated dynamite traverses. Gravity data was collected along all the dynamite traverses. The exploration was done on a 6 X 12 mile grid that covered the entire 1002 study area. The survey and gravity data were tied into the network of data that was collected in 1983 by Itech and Photogravity in the execution of their exploration plan. The data collection was monitored by Fish and Wildlife Service (FWS) personnel that were on the crews throughout the season. There were no significant adverse impacts to the environment as a result of our activity.

Extensive testing of both data collection and data processing parameters was done by GSI and supervised by representatives of GSI's client group. Results of the testing were presented to the group, and parameters used in both the field and the processing center represent a consensus of opinion of the twenty-three (23) companies in the group.

Bottomhole samples were collected in the field at every shothole for the government's analysis. GSI's oil company clients have arranged for analysis of one fourth of these samples so that a detailed lithologic and paleontologic description of the surface of the area may be made.

The data collected this year will ensure that the Secretary of Interior has the best possible data to use in his report to Congress. This request for revision is made so that we can take advantage of the lessons we have learned during this first season of exploration.

REDUCING ENVIRONMENTAL IMPACTS

GSI proposes the use of vibrator crews rather than conventional shothole dynamite crews because vibrator crews substantially reduce environmental impacts by reducing the level of activity in all phases of the operation. Activity is reduced in the main camp, in the logistics and support activities associated with each crew, and along the seismic lines.

Attachments A and B provide a summary of the differences in equipment and personnel for both types of crew. More detailed equipment lists for these crews are provided for reference in Attachments C and D. There are six (6) fewer vehicles, seventeen (17) fewer people and five (5) fewer sleighs associated with each vibrator crew as compared to each dynamite crew.

With the use of vibrators, activities in the main camp are reduced significantly. The fewer sleighs reduce the actual size of the main camp by 29%. With fewer people in the camp, less water is consumed requiring less snow to be melted.

The logistics and support activities associated with a vibrator crew are much less than those needed for a dynamite crew. Fewer vehicles require less fuel. Fewer trips by fuel sleighs between main camps and cat camps have to be made. Fewer flights are made to the main camp to supply spare parts and groceries and to rotate personnel.

With the use of vibrators, the massive organization needed to support the use of explosives on a crew could be eliminated. To supply the crews with the almost 800,000 pounds of explosives detonated on the Refuge this year required overland supply trips every ten (10) days. When production rates improved as weather got warmer in April and May these supply trips were supplemented with supply flights by DeHaviland Twin Otter. This whole activity would be eliminated if vibrator crews were used.

The level of activity on the seismic line is reduced with a vibrator operation because there will be fewer vehicles and people working on the line. The whole difference in numbers of people and equipment results from the elimination of the drilling and shooting.

The level of activity on the Refuge associated with a vibrator crew would be less for reasons besides those that are associated with fewer people and less equipment. The tracked vibrators that are proposed for use on the Refuge can also be used on the ice. Therefore the activities of the third crew that was needed to make the ties to offshore data sets this year could be eliminated. This reduces the duplication of data collection efforts which this year amounted to approximately 40 miles of seismic line.

DATA QUALITY ADVANTAGES

One important measure of the quality of a seismic survey must be the quantity of the data acquired in that survey. With the parameters that might typically be used in a vibrator survey such as are shown in Attachment E, a crew could be expected to collect data at the rate of 3.6 miles per day. During the 1983-84 season experience showed that an average data acquisition rate of 2.5 miles per day could be achieved with explosives as the energy source. Therefore in a fixed length season, much more data could be acquired using the vibrator technique.

The lateral diversity of near surface geology on the Refuge discourages confidence in predicting drilling production. On the other hand, the vibrator production of 3.6 miles per day is estimated with great confidence. Very reasonable estimates may be made when parameters and terrain are known. The typical parameters shown in Attachment E are not meant to be the final parameters that will be used next year. Before the final vibrator parameters are chosen testing would be performed in the field to determine optimal sweep lengths, drive levels and other parameters.

Noises that interfere with desired seismic information are normally either source generated or random. Troublesome source generated noise is usually more severe with the use of vibrator and other surface energy sources than with a deep-hole explosive source. However, because of the coherent nature of most source generated noise, techniques are available with the use of vibrators to reduce significantly the impact of the noise on the desired signal.

One method of attacking such noise is to control the frequency band width of the sweep signal so that the most troubling components of the possible coherent noise trains are not generated, and another method, commonly used, is to adjust the source array in a manner that attenuates the noise trains that are generated. In general, dynamite crews as they are normally used on Alaska's North Slope do not employ extended source arrays for environmental, logistical, and economic reasons, so that the source induced, coherent noise trains that are generated are not attenuated at all by the source deployment technique.

The attenuation of random noises is also important in the production of high quality seismic information. In general, there are more techniques available for reducing the impact of random noise on the final results of a seismic survey conducted using vibrators than using dynamite.

This is, at least in part, because, normally, a vibrator survey that has an energy input that is equivalent to a dynamite survey will be higher CDP fold. Because of the higher fold, the effects of random noise will be significantly reduced in the CDP stacking process. In addition, higher fold data will yield better statistical information for the determination of accurate velocities and statics which in turn will help improve the signal to noise ratio even further. The high technology signal processing measures used in the computer handling of vibrator data, such as correlation, are powerful tools in the further attenuation of random noise, and some of these tools are not available in the normal course of work done using dynamite as an energy source.

It is common practice on Alaska's North Slope to equip vibrator source crews with sophisticated computers that are located in the cabin of the recording truck. The reason for this is that proper quality control of vibrator data requires that it be correlated with the input sweep. GSI's field computer is called an FT-1, and dynamite crews do not normally use them. The FT-1 is also capable of complex data processing beyond the correlation stage, and this additional information is also available for making decisions about parameters with little delay between the time the data is acquired and the time the processed result is available.

It is standard procedure on crews using dynamite as the energy source for the drills to operate a significant distance in front of the recording crew. There are many reasons why this is necessary, not the least of which is that the drills are a source of undesirable noise. The lead distance may be as much as 10 miles. In a vibrator operation, the vibrators are an integral part of the recording operation and proceed along the line of traverse with and at the same time as the rest of the recording crew. If it is decided that a parameter change needs to be made on a dynamite crew, the place along the line to implement the change then needs to be chosen. If the current recording location is chosen, that probably will mean redrilling the amount of the line by which the drills lead the recording crew. If redrilling is sufficiently undesirable, as is normally the case, then parameters can not be changed at the recording location, and there is no guarantee that the desired change will be appropriate further down the line. A vibrator operation is not handicapped in this way, and parameters may be changed without duplicating effort.

During the 1983-84 season several lines were acquired on which comparisons can be made between vibrator data and dynamite data. A list of these lines is enclosed in Attachment F. Our observation is that the vibrator data is generally superior in the shallow section, whereas there are instances where the dynamite data is better in the deeper section. We attribute the superiority of the dynamite data where that phenomenon occurs to the fact that the level of effort with the dynamite source was greater in terms of energy input per unit line length. We confidently predict that if the level of effort with vibrators is increased in 1984-85 over the level of effort with vibrators used in 1983-84, there will be a corresponding enhancement of data quality.

The greater source effort, as reflected in the typical parameters in Attachment C, is used to achieve greater penetration of energy. The amount of sedimentary section seen onshore is greater than what has been seen offshore and it is thus required that more energy be put in the ground to obtain adequate reflections.

CONCERNS ABOUT VIBRATORS

There were several concerns about the use of vibrators in the Record of Decision. These seemed to be that the vibrators were relatively inflexible in their travel routes, that snow had to be bladed for them to vibrate, and that there would be no uphole times or bottomhole geologic samples collected.

A crew using vibrators as an energy source has no less latitude than a crew using dynamite in choosing travel routes that avoid environmentally sensitive areas as found on preprogrammed seismic lines. This claim is supported by the history of seismic work in the oil field at Prudhoe Bay. In that area a crew commonly encounters numerous gathering lines, development structures, and roads. Thousands of miles of vibrator data have been collected on which it was required that the lines be adjusted and the vibrators detoured around many different kinds of obstacles.

The limitations in offsetting the source from the seismic line, either inline or crossline, are determined by spread geometry rather than source type. This year our spread geometry dictated that there could be no crossline offset greater than 880 feet. This provided a corridor of 1760 feet in which the source could be placed. This corridor of 1760 feet applied to the vibrator crew as well as the dynamite crew. If this corridor was not enough to avoid environmentally sensitive areas then the seismic line was bent. A distinct and significant advantage that vibrators have is that they can cross areas that have overwintering fish and need no set back from potentially fish bearing waters as do the dynamite crews.

The only time that snow would be bladed for the vibrators would be when the snow was excessively deep and the actual transport of the vehicle was impeded. With the snow depths generally encountered this past year, 6-24 inches, there would be no need to blade snow for the vibrators.

It is true that uphole times and bottomhole samples are not collected in the course of most vibrator operations. Today's technology makes uphole times useful only in specialized situations. GSI did not encounter any of these situations this last year nor do we anticipate encountering any next year. The uphole times on the ANWR generally ranged from 4 to 8 milliseconds. Residual statics routines in the processing center commonly resolve statics problems on the order of 50 milliseconds and thus can handle any problems that may arise from not recording an uphole time.

GSI would recommend the addition of one drill with driller and helper to each vibrator crew if it is felt that bottomhole samples are needed for the exploration effort next year. This drill could produce samples from 75 foot holes at intervals 1/2 to 1 mile along the seismic lines. GSI's client group will make a recommendation to the Regional Director at a later date on whether or not the sampling program should continue. The recommendation will be based on results obtained from the geochemical analyses that will be performed on over 3,000 of the more than 13,500 samples collected this year.

SUMMARY

GSI successfully collected 760 miles of seismic data for the government and our ANWR group this year. This experience and the consequent lessons learned in the course of the exploration motivate GSI to propose to change the energy source on the seismic crews operating in the ANWR to vibrators rather than dynamite. This change will permit collecting the best possible data for inclusion in the report to Congress on the hydrocarbon potential of the area by the Secretary of Interior. At the same time it will reduce the environmental impacts of the exploration by reducing the level of activity on the Refuge and it will reduce unnecessary duplication. Vibrators provide additional flexibility in attacking data quality problems such as coherent and random noises. What have been previously perceived as limitations to vibrators may be resolved satisfactorily in the processing center and by placing a drill on each crew to collect bottom hole samples.

GSI and our 1984 Arctic National Wildlife Refuge Group are eager to effect this revision. We remain available to you for discussion regarding this request. If you have questions or comments please feel free to call me at 907/563-3070.

Sincerely yours,

GEOPHYSICAL SERVICE INC.

George Buzan

ATTACHMENT A
PERSONNEL COMPARISON

Vibrator Crew		Dynamite Crew	
1	Party Manager	1	Party Manager
1	Administrator	1	Administrator
1	Instrument Engineer	1	Instrument Engineer
1	Asst. Instrument Engineer	1	Asst. Instrument Engineer
4	Cable Truck Drivers	4	Cable Truck Drivers
7	Recording Helpers	7	Recording Helpers
2	Mechanics	2	Mechanics
2	Surveyors	2	Surveyors
3	Survey Helpers	3	Survey Helpers
1	Gravity Meter Operator	1	Gravity Meter Operator
1	Camp Attendant	1	Camp Attendant
1	Cook	1	Cook
1	Cook's Helper	2	Cook's Helper
6	Tractor Operators	7	Tractor Operators
1	Mechanic's Helpers	9	Drillers
5	Vibrator Operators	9	Drill Helpers
		2	Preloaders
		1	Shooter
38	Total	55	Total

ATTACHMENT B
EQUIPMENT COMPARISON

Vibrator Crew	Dynamite Crew
1 Recording vehicle	1 Recording vehicle
4 Cable and geophone carriers	4 Cable and geophone carriers
3 Survey vehicles	3 Survey vehicles
1 Party Manager's snowmobile	1 Party Manager's snowmobile
1 Client Rep snowmobile	1 Client Rep snowmobile
1 FWS snowmobile	1 FWS snowmobile
1 Gravity snowmobile	1 Gravity snowmobile
1 Camp utility vehicle w/crane	1 Camp utility vehicle w/crane
6 Tractors	7 Tractors
1 120 trace TI DFS V	1 120 trace TI DFS V
260 groups of 24 geophones each	260 groups of 24 geophones each
260 groups of cables	260 groups of cables
(12 trailers)	(14 trailers)
1 Survival unit	1 Survival unit
All required survey equipment	All required survey equipment
Two-way radios and other accessories	Two-way radios and other accessories
1 LaCoste-Romberg gravity meter	1 LaCoste-Romberg gravity meter
5 TI tracked vibrators	9 Mayhew 1000 drill rigs
1 Vibrator tender	1 Preload vehicle
1 TI FT-1	1 Shooter's snowmobile
	3 Magazines for explosives
	1 Magazine for detonators

ATTACHMENT C

EQUIPMENT LIST
VIBRATOR CREW

5 Texas Instruments tracked vibrator units (4.25 psi) equipped with Texas Instruments high frequency electronics to allow for operation up to at least 125 Hz. Amplitude ramping of sweeps is available so that high frequencies may be accentuated.

1 Foremost Chieftain tracked recording vehicle (3.52 psi).

1 Vibrator tender (3.52 psi).

4 Cable and geophone carriers (2.81 psi each carrier).

3 Survey vehicles (1.3 psi each vehicle).

1 Party Manager's snowmobile (1.3 psi).

1 Fish and Wildlife Service snowmobile (1.3 psi).

1 Gravity Operator's snowmobile (1.3 psi).

1 Client Representative snowmobile (1.3 psi).

1 Camp utility vehicle with crane (2.81 psi).

6 Tractors (Caterpillar D-7 or equivalent) (10.5 psi each).

1 120 trace Texas Instruments DFS V digital recording system complete with 3 millisecond anti-alias filters and ancillary equipment such as radios, shooting units, input panels, electrostatic camera, tape transports, monitoring equipment, spare parts and all other equipment necessary for CDP recording.

1 Texas Instruments FT-1 Field TIMAP computer with a Gould record section plotter.

260 groups of 24 geophones each (Geospace 10 Hz., 20D digital grade) and necessary cables to serve all geophone groups at a group interval of 110, 165, or 220 feet. Geophones are mounted on arctic base plates.

1 Ski-mounted camp for 50 persons complete with shop, kitchen-diner, washcar, snowmelter, bedding, utensils, tools, communications equipment, and fuel storage for 18,000 gallons.

1 Survival unit for remote deployment.

All required survey equipment such as theodolites, chains, rods, electronic distance measuring equipment, and marking devices.

Two-way radios, fire extinguishers, survival equipment, and first aid kits for all vehicles.

1 LaCoste-Romberg Model D arctic gravity meter

ATTACHMENT D

EQUIPMENT LIST
DYNAMITE CREW

9 Mayhew-1000 drills with air compressors mounted on tracked carriers (2.81 psi each vehicle).

1 Foremost Chieftain tracked recording vehicle (3.52 psi).

4 Cable and geophone carriers (2.81 psi each carrier).

3 Survey vehicles (1.3 psi each vehicle).

1 Party Manager's snowmobile (1.3 psi).

1 Client Representative snowmobile (1.3 psi).

1 Fish and Wildlife Service snowmobile (1.3 psi).

1 Preload vehicle (2.81 psi).

1 Gravity snowmobile (1.3 psi).

1 Shooter's snowmobile (1.3 psi).

1 Camp utility vehicle with crane (2.81 psi).

7 Tractors (Caterpillar D-7 or equivalent) (10.5 psi each).

1 120 trace Texas Instruments DFS V digital recording system complete with 2 millisecond anti-alias filters and ancillary equipment such as radios, shooting units, input panels, electrostatic camera, tape transports, monitoring equipment, spare parts and all other equipment necessary for CDP recording.

260 groups of 24 geophones each (Geospace 10 Hz., 20D digital grade) and necessary cables to serve all geophone groups at a group interval of 110, 165, or 220 feet. Geophones are mounted on arctic base plates.

1 Ski-mounted camp for 65 persons (14 trailers, 6.0 psi each) complete with shop, kitchen-diner, washcar, snowmelter, bedding, utensils, tools, communications equipment, and double-walled fuel storage for 18,000 gallons.

1 Survival unit for remote deployment (6.0 psi each trailer).

Magazines to provide storage for 60,000 lbs of dynamite (8.0 psi).

1 Magazine for detonators.

All required survey equipment such as theodolites, chains, rods, electronic distance measuring equipment, and marking devices.

Two-way radios, fire extinguishers, survival equipment, and first aid kits for all vehicles.

1 LaCoste-Romberg Model D arctic gravity meter.

ATTACHMENT E
TYPICAL VIBRATOR PARAMETERS

CDP Fold	60	60	30	30
# Groups	120	120	120	120
Group Interval	110	165	110	165
Geophones/Location	24	24	24	24
Geophone Spacing	4.2 ft	13.8 ft	4.2 ft	13.8 ft
VP Interval	110	165	220	330
Near Trace Offset	275 ft	412.5 ft	275 ft	412.5 ft
Sweeps/VP	4	6	6	10
Sweep Length	12 sec	12 sec	12 sec	12 sec
Listen Time	8 sec	8 sec	8 sec	8 sec
Production Estimated in Miles/Day	3.6	3.6	4.5	4.15

ATTACHMENT F
LINES FOR DATA COMPARISON

Dynamite	Vibrator
AN84-1	ANV84-1
AN84-10	ANV84-10
AN84-12	ANV84-12
AN84-14	ANV84-14
AN84-16	ANV84-16
AN84-18	ANV84-18
AN84-3	ANV84-3
AN84-30	ANV84-30
AN84-32	ANV84-32
AN84-34	ANV84-34
AN84-7	ANV84-7

Western Geophysical Co. of America

Exploration Plan

for

Proposed Oil and Gas Exploration within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska

June, 1984

WESTERN GEOPHYSICAL COMPANY OF AMERICA (WESTERN) hereby submits this Exploration Plan for Proposed Oil and Gas Exploration within the Coastal Plain of the Arctic National Wildlife refuge (ANWR) in Alaska. This plan is submitted in accordance with the requirements of 43 C.F.R. §37.1 et seq. and sets forth the information required by §37.21 of the Regulations.

I. INTRODUCTION

Section 1002 of the Alaska National Interest Lands Conservation Act (ANILCA), 16 U.S.C. §3142, requires the exploration of the ANWR with the objective of acquiring the best attainable data with which to evaluate the costs and benefits of developing the coastal plain's oil and gas reserves. In recognition of the fact that the area comprises a national wildlife refuge and contains unique natural attributes together with the potential for vast oil and gas reserves, ANILCA further requires that the necessary exploration be accomplished in a manner that avoids significant adverse effects on the environment and its fish and wildlife.

The first year of exploration under the mandated program has been completed. We understand that the resulting data contain strong evidence of the existence of highly prospective areas including one or more large, symmetrical anticlines at depths consistent with a reasonable probability of significant hydrocarbon content. Because of limitations imposed on the method of exploration during this initial period, it is unlikely that any significant lithologic information can be extracted from those data. It is probable therefore that it will not be possible to determine whether, in the prospective areas, there exist zones of porous rock that can form petroleum or natural gas reservoirs of significant extent. We are also informed that the data do not lend themselves to determinations of whether there are significant faults or facies changes within any potential reservoir zone. In order to make such a determination it would be necessary to survey the area with a procedure such as the one described in this plan that would obtain data of a substantially higher signal-to-noise ratio. Such data can then be used as input to WESTERN GEOPHYSICAL COMPANY's proprietary and exclusive SLIM process for lithologic modelling (See Exhibit E). That process can produce information as to the porosity, facies changes, and minor faulting that may be found within the prospect. If faulting or facies changes are indicated as being within potential reservoir rocks, it will be possible to determine which part of the structure offers the greatest potential.

We therefore propose the program described below to obtain the high quality data that will be needed to carry out the mandate of Sec. 1002 of ANILCA, 16USC §3142.

As set forth below, WESTERN is eminently qualified to meet both of these objectives. Today WESTERN is the acknowledged leader in the geophysical exploration industry. Since 1957, WESTERN has been involved continuously (though seasonally) in geophysical exploration in Alaska and in other Arctic regions. We are thoroughly familiar with the area's terrain and with the technicalities and operational difficulties associated with work in the

Arctic. In the process of acquiring this experience, WESTERN has had numerous occasions to structure its exploration activities to conform with the environmental requirements mandated by the State of Alaska, local municipalities and Native groups, as well as by the Federal Government. Because the avoidance of significant adverse effects on the area's fish and wildlife and their habitat depends primarily on the permittee's working knowledge of those realities, WESTERN is a highly qualified candidate for exploration of the ANWR within the environmental guidelines mandated by ANILCA and set forth in the Regulations. Equally important, data recorded and processed by WESTERN is recognized by the Alaskan oil industry as being the highest quality to be obtained. Top quality data will be of major significance in aiding the Secretary to make his best evaluation of the area for his ultimate report to Congress.

In the half century that WESTERN has been in existence, it has grown until now it is the largest geophysical company in the world. Such growth would not be possible without the confidence and support of satisfied clients. WESTERN holds patents on over 150 items directly related to seismic exploration and has made sizeable contributions to the development of techniques that have brought the exploration for hydrocarbons to the advanced state it enjoys today.

WESTERN's processing and interpretation of data has constantly kept pace with the tempo set by its field acquisition methods. This combination of scientific research/development and practical know-how should qualify WESTERN for the important mission of fulfilling the provisions of §1002 of ANILCA.

II. RESPONSIBLE PERSONNEL

WESTERN's supervisory personnel who would be directly responsible for the ANWR project include Herman Semeliss, Area Manager; Supervisors Roy I. Morris and Ron Bakke; Shop Supervisor Oliver Krein; Survey Supervisor William Sands; and Administrative Supervisor John Bowers. The total tenure with WESTERN of the key personnel now stationed in Alaska is over 130 years. More than 100 years of this time has been spent in the Arctic or sub-Arctic.

Mr. Semeliss will be in complete charge of all phases of the operation and will be assisted at the field level by Supervisors Morris and Bakke.

Mr. Krein will supervise all support functions related to mechanical equipment and will develop specialized gear as required to complete the project. Mr. Sands will oversee all phases of survey work, including layout, control, and map making, using the most modern, state-of-the-art computerized equipment. Mr. Bowers will act as liaison between all governmental agencies and private organizations.

In Washington, D.C., WESTERN is represented by the law firm, Cotten, Day & Doyle.

III. PLAN REQUIREMENTS

This Plan sets forth the information specifically required by §37.21 of the Regulations and in general describes the guidelines that WESTERN will observe in order to discharge its obligations under the letter and spirit of 43 C.F.R. §37.1 et seq. Upon acceptance of this Plan and subsequent grant of a Special Use Permit pursuant to §37.23, a detailed Plan of Operation will be submitted in accordance with §37.24.

Period of Plan.

This Plan anticipates the active involvement of WESTERN during all phases of the ANWR exploration process, through the 1984-85 winter season, and, in the event of a Congressional extention of the time period within which to accomplish such exploration, we could possibly have additional program to add to our basic grid.

The seismic program we are submitting for consideration consists of 750 miles of line in a pattern specifically designed to supplement the data obtained in the first year of exploration and to fill some of the gaps left in that survey. Departures, adjustments, and alterations from this basic grid pattern will be made as required to avoid significant impacts to the ecological, cultural, and archaeological resources of the area as further described in this plan. Based upon our estimate of the allowable working season, we compute that it would take two (2) crews working the entire season to complete the program. Since the opportunity to explore ANWR is limited, it is our opinion that data quality should not be sacrificed in order to achieve greater (faster) production. Hence, our program is based on acquiring 48-fold data. If during the survey, the line orientations or a different multiplicity (fold) are required for parts of the area to optimize the geophysical data obtained, we are prepared to make the needed changes after we have received approval from all concerned authorities.

Therefore, our application consists of requesting permission to operate two (2) seismic crews for the winter season of 1984-85.

IV. RESPONSE TO ITEMS IN REGULATIONS

The following information is intended to respond directly to specific items enumerated in the Regulations as §37.21(d)(1) through (14).

(1) Permittee.

The name of the applicant is WESTERN GEOPHYSICAL COMPANY OF AMERICA, a wholly owned subsidiary of Litton Industries. Our headquarters are at 10,001 Richmond Avenue, Houston, Texas 77042, (713) 789-9600. WESTERN is organized and exists under the laws of the State of Delaware and was incorporated under its present name on May 23, 1955. WESTERN is duly licensed and authorized to carry on business in the State of Alaska.

WESTERN's principal officers include Mr. Howard Dingman (President) and Mr. Neal P. Cramer (Executive Vice President and Manager of Operations), both of whom are located at WESTERN's Houston headquarters and both of whom are familiar with operations in Alaska and the terms of this Plan. As indicated previously, WESTERN's officer in charge of all Alaska operations is Mr. Herman A. Semeliss, Area Manager for Alaska, located in WESTERN's Anchorage office at 351 East International Airport Road, Anchorage, Alaska 99502, (907) 563-3511.

In direct charge of Alaska field operations are Supervisors Roy I. Morris and Ron Bakke, domiciled at WESTERN's Anchorage office or at WESTERN's base camp in Deadhorse, Alaska, (907) 659-2509.

(2) Participants

WESTERN's application is based on our being granted a permit to conduct a speculative survey. The speculative survey is the most common method in use by industry today to acquire quality seismic data which is then sold to a broad spectrum of purchasers thereby reducing the cost to the individual buyer to a point where only a group with a very large number of participants can compete economically.

In the past decade, WESTERN alone has conducted over 500,000 miles of speculative surveys - over 100,000 miles have been acquired in Alaska alone. It is our evaluation, that, industry-wide, speculative coverage out-paces coverage acquired by group participation by a factor of about 10 to 1. Thus, it is quite apparent that speculative surveys provide a universally accepted source for low-cost seismic data.

Using the speculative approach, WESTERN would undertake the proposed exploration program using our own risk capital in the expectation that our program and the quality of our results would be such that the oil companies and other persons who would have interest in any lease sale would ultimately purchase our data.

There are several advantages to this approach:

a) Companies do not have a commit fiscal resources in advance. They pay only upon delivery of data.

b) Companies are not required to purchase all of our data. They are permitted to inspect the data before purchase and select only the data they wish to buy.

c) A published price list will be available covering the price per mile for various quantities of data purchased.

d) This price list is fixed with no penalty for late-comers. This factor, coupled with no requirements for up-front money, should encourage broader participation by industry and any other persons interested.

e) The identification of WESTERN as a single permittee makes us exclusively responsible for compliance with applicable environmental safeguards and eases the Government's role in monitoring the permittee's discharge of its regulatory responsibilities. This results from the fact that WESTERN, the permittee, is the actual operator of the Plan rather than the supervisor of a contractor with derivative regulatory responsibilities. When the Regional Director or his authorized delegate indicates a need for immediate action or for the immediate cessation of activities to accommodate an unforeseen environmental contingency, WESTERN can comply instantaneously with no need to induce compliance by others.

f) With regard to the quality of data, WESTERN commits itself to the acquisition of the highest quality data, free from the constraint of budgetary limitations resulting from the specific sums committed in advance by group participants. In the event of unforeseen obstacles that may arise from weather conditions, environmental contingencies or other hardships, WESTERN will not be forced to halt its data acquisition if those budgetary resources have been exhausted. Instead, WESTERN will continue its data acquisition until the program is completed.

We are confident that allowing WESTERN to conduct a speculative survey as outlined will accomplish the mandated goals of providing quality data for the Secretary's ultimate analysis and, concurrently, will best protect the environment by placing the onus for compliance on a single reputable company. In addition, industry will be well served by having a good source of quality data at a competitive price.

(3) Technical and Financial Ability

WESTERN GEOPHYSICAL COMPANY has been active in Arctic and sub-Arctic seismic exploration for twenty-seven years. During this time, the COMPANY has amassed an abundance of technical knowledge, expertise, and experience in the unique features of the Arctic environment.

WESTERN GEOPHYSICAL's technical competence and reputation for professional excellence are unsurpassed in the geophysical contracting industry. With a research and development staff numbering 268, WESTERN is at the cutting edge of advanced geophysical exploration technology. Among other indicia of our level of technical achievements is the fact that we presently have more than 100 active U.S. patents covering every phase of geophysical recording, processing, and interpretation with some 50 patent applications still pending. No other geophysical contractor can approach even half this number. In addition, at technical conferences and meetings of professional geophysical societies and in professional journals, papers on WESTERN's research are invited, accepted, and published much more frequently than those of any other contracting organization. Many major oil companies select WESTERN to perform services for them on a preferential basis to the extent that WESTERN GEOPHYSICAL is now, and for some years has been, the largest geophysical contractor in the world, a world in which contractors are selected primarily on the basis of technical competence.

With regard to our ability to operate effectively while still observing close permit and environmental constraints, we cite some recent examples. In April, 1981, WESTERN conducted a program in the vicinity of Itkillik Lake in the Gates of the Arctic National Park and Preserve. WESTERN was advised that there were 49 archaeological sites in an area of less than 12 square miles and that all of the sites were vulnerable to damage from exploration activities. Because of the sensitive nature of the situation, a National Park Service Archaeologist was flown to the crew site and he, along with WESTERN's Party Manager, spotted the sites on the ground. As a result of this coordination there was absolutely no damage reported by the Park Service after a check trip when the area was free of snow. During the course of his visit, the archaeologist was able to instruct WESTERN personnel as to what to look for in an area of suspected archaeological importance.

WESTERN also obtained permits in the area at the west end of Harrison Bay and extending inland onto the National Petroleum Reserve-Alaska (NPR-A). For this particular prospect, permits were obtained from the State of Alaska, Department of Natural Resources (MLUP/NS 80-171), and the Bureau of Land Management (BLM) (TUP F72685) and the USDI, Geological Survey (OCS Permit No. 81-01). The portion of the prospect on NPR-A contained the withdrawal site of the Village of Nuiqsut Village Corporation, seven native allotments and 15 Cultural Resource Sites as indicated by the United States Bureau of Land Management (BLM). A small segment of one line crossed Nuiqsut lands, and a fee was paid to the Village upon completion of the survey. BLM maintained close surveillance during the progress of this program and found no objectionable conditions. Exhibits "B" and "C" hereto are the Permit Attachments indicating the Native withdrawals and Cultural Sites.

Regarding our financial capability to carry out the planned survey, we confirm that WESTERN is the largest geophysical company in the world, and we are maintaining a strong balance sheet, even in today's depressed times. We are a subsidiary of Litton Industries, a 5-billion dollar company. Should the need arise, we can certainly provide fiscal proof of our financial ability to undertake this mission. In any event, the proposed program will represent less than one percent of our company-wide activity, thus we shall have adequate reserve capacity to cope with any foreseeable contingency.

In Alaska at the present time WESTERN has new and modern equipment (used not more than two seasons) to operate six seismic crews. In addition, we have a cadre of experienced personnel to man these crews and provide excellent supervision of the activities. We own a large, well equipped facility in Deadhorse which is backed up by excellent logistic and technical support from our Alaskan Headquarters in Anchorage and our corporate facilities in Houston.

The Deadhorse base camp represents a unique attribute to the ANWR exploration program because the camp is equipped with a complete data processing center, including the recent addition of a Litton Resources Systems' LRS-3200 Seismic Data Processing System, that enables data from the field to be assimilated and processed within a matter of hours. The camp is capable of housing and feeding up to 40 people and has served as an excellent support facility for WESTERN's operations in Alaska since 1974. There is a complete radio maintenance shop, warehouse with complete replacement parts, and an instrument repair facility manned 24 hours a day by experienced technicians. SSB radio, telephone and FM communications are maintained at all times to support the field crews.

(4) Geographic Area of Proposed Activities.

The attached map (Exhibit "A") at 1:250,000 scale indicates the proposed program to be conducted under the provisions of the Special Use Permit. It consists of 750 miles of seismic line in a grid adjusted designed to supplement and elucidate existing data.

Basic Supply Routes

Basic supply routes within the Refuge will follow existing trail, established vibrator lines or traditional routes when safe and practical.

Routes to and from supply points outside the Refuge and routes to the actual survey area will be over traditional winter trails or ice roads, as available.

Principal Fuel Caches

The primary source of fuel will be at a staging area outside of the Refuge and transport to the crew sites will be performed by rubber-tired buggies using existing trails.

Critical Areas

Critical areas have been tentatively identified by the FWS on 1:250,000 maps. However, WESTERN will consult with the FWS, local residents, and our private consultant prior to activity. WESTERN's efforts in this regard are described more fully in the section below addressing environmental impacts and the measures that will result in the prevention of significant adverse effects.

(5) General Description of Exploratory Activities.

WESTERN will conduct the survey using the VIBROSEIS technique. Crews will be placed in the field and coordinated to utilize the maximum amount of logistic support without undue traffic. The program will start at a point near the northwest corner of the Refuge and will work to the southeast along vibrator shot lines. At the present time it is anticipated that vibrator energy will be introduced into the ground at 24 points within a given mile. While the program is laid out in straight lines, WESTERN will depart from those lines or use undershooting techniques as may be required to avoid environmental hazards, archaeological sites, or other obstacles. We have the required processing techniques and field recording methodologies to handle such deviations with no or a minimal impact on data quality. The availability of the processing center located at the Deadhorse base camp referred to previously provides the ability to analyze the resulting data immediately and permits the readjustment of parameters. This enables WESTERN to avoid any unnecessary duplication of seismic work that might otherwise result if the Deadhorse data processing facility were not available.

In order to determine the optimum VIBROSEIS sweeps including frequency ranges, sweep length, and number of sweeps per vibra point, tests will be conducted at periodic intervals. WESTERN has developed an elaborate, proprietary procedure for conducting such tests and for analyzing the results. It is anticipated that tests will be conducted at the commencement of the survey and every time a change in surface or near-surface geophysical characteristics is encountered. WESTERN's Applied Technology/Land Department is staffed to supervise and conduct such tests and to analyze the results. Experts in field procedure and analysis are dispatched worldwide to supervise procedures for the selection of survey parameters and are available to advise by radiotelephone in the event an unexpected change in conditions is encountered. The full power of this unit and its procedures will be available to the ANWR survey at all times.

WESTERN is proposing that no explosives will be used in the carrying out of this Plan.

(6) Unnecessary Duplication.

We recognize that FWS has the task of preventing over-laid effort by different permittees. The proposed program will not duplicate any existing survey line but will supply the needed information that is lacking in the existing survey. However, apart from this, there are other potentials for duplication of effort. One of these would involve re-shooting caused by recording of unacceptable data. With our capability for immediate instrument checks and processing in our Deadhorse Facility, any re-shoot duplication should certainly be minimized. As explained on page 21 and referenced on page 3, our unique processing computer capability enables WESTERN to make any necessary technical adjustments within 24 hours of original data acquisition. This extremely quick turnaround will enable WESTERN to avoid the necessity of reshooting and hence duplicating unnecessarily any substantial portion of its survey if unexpected geological or geophysical situations are encountered that mandate a change in exploration techniques or routing.

Another possibility exists in having a line (lines) laid out and then discovering that it encroaches on an environmental feature. To minimize this risk WESTERN has retained the Alaska Biological Research Group (ABR) a member of which will be available to accompany WESTERN's crews. ABR is a recognized leader in expertise concerning the area's environmental features.

(7) Schedule.

WESTERN GEOPHYSICAL COMPANY will begin work on the prospect in the 1984-85 winter season as soon as permits are issued and weather conditions allow movement with ground contact vehicles. No attempt will be made to move any equipment over ground where there is no adequate protective cover within the meaning of these Regulations. These conditions will be the basis for request for a clearance from the FWS, and moves will not be made until written notification is received from the Regional Director. Past experience has shown that these conditions usually occur in the time period between December 15 and January 1.

WESTERN will perform an aerial reconnaissance of the area, using helicopters to check on stream crossings and other possible conditions, and then will send the surveyors to find the most suitable trail for the move to the prospect area. Maintaining constant radio contact, the main body of the crew will depart the staging area following the trail established by surveyors. Data acquisition will begin shortly after arrival on site. The work plan will be scheduled so as to place all equipment in position near the staging area when breakup is imminent. This usually occurs between May 1 and May 15. In any case, the crews will plan their moves so as to be in a position to clear the ANWR in minimum time after written notification by the Regional Director.

(8) Communication Techniques.

WESTERN's communication network is the result of many years of experience in the Arctic. It starts at Anchorage with a telephone link to the Deadhorse Base Camp and extends to the field crews via both single side band radio and FM radio. Each field crew has both types of radio equipment in camp at all times and all WESTERN vehicles have some form of radio communications to allow constant contact with other vehicles and the base camp and/or the party headquarters. It is planned to establish direct radio links with all FWS field personnel to provide a constant line of communications with the Service for advice and progress reports.

The Deadhorse Base Camp has a completely equipped radio maintenance shop with a fully qualified technician available to service all types of radio gear.

Because of the crowded conditions on some FM channels it has become necessary to coordinate carefully the use of the band with other users. The Regional Director should be prepared to establish priorities for the use of the FM band in the event that multiple permits are issued to operate in contiguous areas.

(9) Equipment, Support Facilities, Methods of Access and Personnel.

WESTERN GEOPHYSICAL COMPANY will field two crews each consisting of 40 men. The camps for these men are portable, completely self contained and meet all existing standards for housing pursuant to state statutory and regulatory requirements. Depending on the terrain, the camps will be sled-mounted or tracked. The sled types are used on the flat areas and the tracked ones are used in rougher terrain to avoid damage to the vegetation mat and the stream banks. The camps are moved by towing with the CAT tractor and in almost all cases the move route is along an existing vibrator line. If any surface damage results, WESTERN will take all necessary steps to rehabilitate and/or revegetate damaged areas. Gray water is filtered and sterilized before disposal and all solid waste is incinerated with residue, if any, backhauled to an approved disposal site. Personnel, supplies, and expendables will be delivered to camp sites either by aircraft or a Delta III all-terrain vehicle. If aircraft is used, it would maintain a minimum altitude of 1500' except during landing and takeoff. Vibrators can be either track or wheel mounted, depending on the terrain.

Fuel will be supplied to the crews by overland vehicles using program lines wherever possible to avoid duplicate tracks. Storage of fuel on the crew will be in metal tanks with all personnel involved in the transfer or storage of any fuel or hazardous materials thoroughly trained in the use of clean up procedures.

Travel to and from the program lines will be via the same routes, if possible, and operators will be instructed not to deviate from marked trails unless there is danger to human life.

Examples of all camp and vehicular equipment are available for immediate inspection at the Anchorage Headquarters of WESTERN GEOPHYSICAL COMPANY located at 351 E. International Airport Road.

The Anchorage installation is also the base for logistic, mechanical, technical, and personnel support for all North Slope activities. A warehouse facility and a five-bay shop furnish all the needed supplies and repair facilities so as to avoid any down time. The base camp at Deadhorse maintains a complete inventory of replacement parts up to and including engine assemblies for all WESTERN equipment. There is a complete radio and instrument repair and maintenance shop staffed by qualified technicians at the base camp and the technicians travel to remote camp sites for periodic testing to prevent breakdowns and to maintain quality standards in the industry.

(10) Hazardous Substance Control and Contingency Plan.

The WESTERN GEOPHYSICAL Oil and Hazardous Substances Contingency Plan is appended as Exhibit "D" and is the basis for intensive training before any WESTERN personnel are assigned to units working on or near the Refuge.

In addition to the Plan, WESTERN employs the services of specialists in oil control and clean up and constantly employs their expertise to further the scope of the COMPANY's operators' knowledge. If, during the course of the exploration, new methods or standards are evolved, WESTERN will immediately adopt them for field use.

(11) & (12) Anticipated Environmental Impacts and Procedures for Monitoring Same.

The environmental impacts from the activities proposed in the Plan will be minimized due to the measures WESTERN will undertake to avoid any adverse effects. As already indicated, WESTERN has retained the services of the Alaska Biological Research (ABR) group to assist in identifying specific locations in advance that may be vulnerable to particular activities. This group consists of James Curatolo, Robert Ritchie, Martha Robus, and Steven Murphy, all of whom are experienced biologists with expertise in the Alaskan environment and are well known in the Alaskan environmental community. In addition, WESTERN will cooperate fully with all agencies and private groups in the matter of environmental impacts. In this regard, it is anticipated that FWS will have monitors on site regularly. Any concerns expressed by the monitors will be accommodated by necessary and appropriate adjustment in WESTERN's methods or schedule.

Copies of all Regulations, special stipulations and the Special Use Permit will be posted in the following locations at each camp: in the Party Manager's office: Mess Hall; Recreation Room; and each individual sleeper unit. Each employee will be required to certify that he has read and understands the terms of each item listed above. This certificate will be retained in the employee's file and will be available for inspection by the Regional Director or his authorized representative. Employees will be encouraged to report any sightings of potential environmental damage, no matter what the cause.

The primary environmental impact of WESTERN's proposed activities will result from the movement of WESTERN's men and equipment over the terrain. However, because there will be an adequate protective cover as determined by the Regional Director and communicated to WESTERN in writing, it is anticipated that WESTERN's activities will result in little or no damage to the terrain, and certainly no significant adverse effect within the meaning of the Regulations.

The trail left by the movement of men and equipment in most cases is clearly visible for the duration of the winter season. Further, we believe that upon certain infrequent occasions, the ground or vegetation may be reached by the plowing of snow. However, WESTERN can and does hereby state on the basis of its own experience (which is in keeping with the common knowledge of those persons familiar with these operations) that any effects of such a nature are reversible and will not be visible following the passage of a new season.

If, in the opinion of the Regional Director, any portion of the ground, vegetation, ecosystem or any aspect of the environment is affected in an adverse manner by WESTERN's activities, WESTERN hereby commits to expend such of its own resources as may be necessary and reasonable to ameliorate any such effects.

In addition to relying on the FWS Regional Archaeologist and appropriate local and Native representatives, WESTERN will utilize the services of ABR in addition to its own survey team to identify areas of archaeological and cultural importance. Any such areas, in addition to all standing structures or substantial above-ground surface remains, will be avoided and will remain untouched and undisturbed.

As indicated at the pre-application conference on April 26 and 27, 1983, the location of most of all tent rings has now been identified. It is therefore possible to proceed with no significant possibility of disturbance to such structures.

Under the supervision of the FWS Regional Archaeologist and with the assistance of ABR, the Alaska State Historic Preservation Officer and the Advisory Council on Historic Preservation, all standing structures and substantial above-ground surface remains will be clearly identified. These sites will be marked in a clearly visible fashion that will prevent any possibility of disturbance. These and any other known archaeological, cultural, geological or environmentally sensitive areas will be thoroughly discussed before proceeding. Photographs of such areas will be available for each crew member for the purpose of assisting in the positive identification. Markers placed in the field to signify such areas will be removed by WESTERN upon completion of operations, or at such other time as may be directed by the FWS.

WESTERN will immediately report to the FWS any cultural resource site or material discovered during the course of its work and will avoid any further contact at such sites until they can be evaluated by the FWS.

In respect to the effect of WESTERN's activities on fish and wildlife in the area, WESTERN submits that the ability of the permittee to avoid any significant adverse effect on such fish and wildlife is primarily related to the permittee's working familiarity in the area. During the 27 years that WESTERN has been operating in the Arctic and sub-Arctic environment (Alaska particularly), the COMPANY has been at the forefront of efforts to study the effect of seismic activity on various forms of wildlife.

Following is a delineation of wildlife known by WESTERN to occur in the subject area together with a description of the seasonal occurrence and other characteristics of such wildlife based on WESTERN's studies and observations. WESTERN, of course, will defer to the Regional Director or his authorized representative in the event of any uncertainty concerning the possibility of significant adverse effect to any wildlife. In general, WESTERN's assessment of the impact, if any, of its activities on the area's wildlife is based on the seasonal occurrence of particular species, as indicated in the Yearly Cycle graph contained in the Initial Baseline Study. That graph is set out as Exhibit "E" hereto.

FISH

Twenty-nine species of fish are known to inhabit Arctic marine, estuarine and fresh-water environments on or adjacent to the proposed program area. Arctic char, grayling, cisco and whitefish seem to be the most important for subsistence use. All major streams are fished during the open water season. Lakes are uncommon in the proposed program area, with most of them being thaw lakes located along the coast. The coastal lakes less than 2 meters in depth usually freeze to the bottom or offer poor winter fish habitat because of the concentration of dissolved solids and low dissolved-oxygen levels. Coastal lakes may also be brackish due to saltwater intrusion of windblown spray from the ocean.

Several drainage areas originate in or transect the proposed program area. These streams range from small tundra streams with intermittent flow to the Canning River with an estimated 50-year flood discharge of 13,500 cubic feet per second (Childers and other 1977). Most of the water supply comes from precipitation, surface permafrost-thaw processes, deep lake drain, and spring or ground water. Peak flows occur with snowmelt in early summer or with rainfall during later summer or early fall. By October, most rivers cease to exhibit any measurable flow and as shallow areas freeze to the bottom, overwintering fish become isolated in deeper pools or spring areas. The ice accumulation usually reaches maximum thickness between late March and early May.

To mitigate any damage to overwintering sites, WESTERN GEOPHYSICAL COMPANY will avoid introducing any energy into the ground within 660 feet of any stream or river that has been designated as a possible overwintering site. No water will be drawn from any lake or stream designated as having a fish population. In addition, all seismic lines will be oriented so as to cross the water courses at as sharp an angle as possible and not to run parallel to the stream or river. Crossing of rivers will be completed in one trail, if safety permits, with no alteration to existing river banks. Any snow used to create snow bridges will be removed upon completion of the line. Crossings will be oriented so as to avoid damage to willow stands at river banks.

Strict prohibitions regarding fishing or hunting during the proposed seismic exploration will be enforced with instant dismissal being the result of any violation by WESTERN GEOPHYSICAL COMPANY employees.

MARINE MAMMALS

In addition to the Polar Bear, the Bowhead and the Beluga whales utilize the waters of the Beaufort Sea along with ringed, bearded and spotted seals. Al of these species inhabit the waters to the north of the ANWR, but there is some evidence that ringed seals may use the lagoon areas within the Refuge during the summer and fall. While this is outside the time frame of the proposed seismic activity, it is mentioned as a point of interest.

WESTERN GEOPHYSICAL COMPANY has been active in the study of the effect of seismic activity on the ringed seal population for the past two years and is currently doing contractual work for the National Marine Fisheries Service in the vicinity of Reindeer Island in which ringed seal habitat and pupping is correlated with seismic activity using vibrator energy sources.

No impact on the whale population is anticipated because of the time frame. Bowhead whale migration to the east takes place in early spring, following leads in the ice. The summer feeding grounds extend from the Canadian waters to just east of the village of Kaktovik. This range is occupied from mid-May through September. Migration out of this area may begin as early as mid-August and is nearly completed by mid-October.

Polar Bears

Pregnant females form snow dens in October and November and give birth in December and January. Females and cubs emerge from dens in late March and April. Factors necessary for continued successful denning in an area include the ice movements which allow the bears to reach the area in the fall; occurrence of food (seals) in the area; topography, snowfall, wind and ambient temperatures, all of which provide for snowdrifts that do not thaw during the denning period. Dens consist of one or more chambers, connecting tunnels and exit-entrance tunnels. Alaska dens are found inland as far as 50 km from the coast, along the coast, on offshore islands, on shorefast ice and on drifting sea ice. In April 1957, a two-man team was hired from the village of Kaktovik to search the area in the Arctic National Wildlife Refuge between the Hulahula and Katakturuk Rivers and the Jago and Kongakut Rivers. No polar bear dens were found.

The number of bears coming to a specific coastal area may vary from year to year depending on the type of ice and the time it forms. Bears are more abundant along the coast in years when winds bring heavy ice to the coast early in the winter than in years when newly frozen ice drifts in or new ice is frozen in place for a considerable distance from shore.

The Beaufort Sea outer continental shelf and the coastal plain of Alaska has high potential for oil and gas. Extraction will likely be a major goal on State lands, on native lands, and may occur on the coastal plain on ANWR. A number of actions can be taken to protect bears and their habitat. For such protection, the ecosystem approach over large areas should be followed rather than a species by species approach in restricted zones. This will require the cooperation of federal, state and local governments with environmental groups, oil and gas lease holders and seismic exploration crews to create land and offshore management regulations. Specific development proposals, including plans to remove snow from drift areas for trails or the construction of airstrips, will be reviewed by the Regional Director to minimize negative impact on denning areas. "No Activity" zones will be created, by order of the Regional Director, around areas identified as polar bear dens as identified by the U.S. Fish & Wildlife Service.

Camps maintained to support seismic activities will be established inland rather than on or near routes bears normally travel along the coast. Garbage will be incinerated daily and state and federal regulations regarding the feeding of wild animals will be strictly enforced. All WESTERN personnel will be advised that any violation of any wildlife laws or regulations, state of federal, will be sufficient cause for immediate dismissal. All fuel will be stored in suitable containers surrounded by dike areas lined with impermeable material.

WESTERN GEOPHYSICAL COMPANY proposes that studies be initiated to delineate areas of critical polar bear habitat, especially denning areas. The relative importance of coastal areas as opposed to sea ice for denning is to be determined. Effects of disturbance on individual bears, particularly denning females will be quantified. This will require observations of disturbance effects, either artificial or actual, during the pre-denning, denning and post-denning periods. It is proposed that these studies be conducted, by personnel designated by the Regional Director, during the time actual seismic surveys are being conducted by WESTERN GEOPHYSICAL COMPANY. By doing this, the FWS will enjoy the full logistic support offered by WESTERN and can conduct the research under closely controlled conditions. Similar studies were conducted by Kelley and Burns in the winter season of 1981-82 relative to the effect of seismic activity on the ringed seal population. The data acquired in this proposed study will prove extremely useful to the U.S. Fish & Wildlife Service in future planning and habitat management and will afford WESTERN GEOPHYSICAL COMPANY personnel the opportunity to become proficient in the recognition of critical signs in the Arctic Wildlife Refuge or any other sector of the Arctic.

THREATENED AND ENDANGERED SPECIES

Endangered species encountered in the proposed exploration area include the Bowhead and Gray whales and the Arctic peregrine falcon. The whales have been discussed in the paragraphs regarding marine mammals.

Peregrine falcons nesting habitat is not abundant north of the Brooks Range in ANWR. However, a limited number of peregrines have been reported nesting there in past years. The most recent survey of raptor habitat in ANWR found no nesting peregrines. This survey was conducted in August, however, and may have missed peregrines which attempted to nest but were unsuccessful. Among the eyries formerly or potentially occupied by peregrines within ANWR, only two are within the Arctic Coastal Plain study area--on bluffs or cliffs along the Sadlerochit and Jago Rivers.

Peregrine falcons are highly migratory and spend a relatively short period in Alaska. Arctic peregrines generally arrive at their North Slope eyries between April 21 and May 7; egg laying and incubation occur between May 15 and July 21; the young leave the nest during August.

There appears to be a significant movement of arctic peregrine falcons through the study area on the Arctic Coastal Plain from late August to mid-September. The number and timing of these observations suggest that at least some of the peregrines are following a coastal migration route.

The Office of Endangered Species of the FWS has provided a no jeopardy biological opinion, dated July 28, 1982 (see page C-4, Appendix C FEIS).

BIRDS

Review of Bird Studies

There are many bird populations within the proposed study area. Below is a summary of the important populations and species of birds:

Populations	Species
Seaducks	Oldsquaw (Clangula hyemalis) Eiders (Somateria spp., Polysticta stelleri) Scoters (Mellanita spp.) Merganser (Mergus serrator)
Dabbling Ducks	Pintail (Anas acuta)
Geese	Brant (Branta bernicla) Snow goose (Chen caerulescens) White-fronted goose (Anser albifrons) Canada goose (Branta canadensis)
Gulls	Glaucous gull (Larus hyperboreuos) Ross' gull (Rhodostethea rosea)
Tern	Arctic tern (Sterna paradisaea)
Shorebirds	Red phalarope (Phalaropus fulicarius) Northern phalarope (Lobipes lobatus) Plovers (Pluviolis spp.) Sandpipers (Calidris spp.)
Songbirds	Lapland longspur (Calcarius lapponicus) Snow bunting (Plectrophenax nivalis)

Several large multi-disciplinary studies, which have included birds, have been conducted in nearshore estuaries in the Harrison Bay/Simpson Lagoon area (Hall 1975; Johnson and Richardson 1980 report the results of coastal bird surveys from Harrison Bay eastward to, and in some cases, including the coast of the Arctic National Wildlife Refuge). Martin (1980) and Spindler (1978a) summarize terrestrial studies of birds by the U.S. Fish & Wildlife Service in Canning/ Staines River delta region and in the Okilak River Delta, respectively. Spindler (1978b), Johnson and Richardson (1980), Schmidt (1973) and Gollop and Richardson (1974) conducted investigations in nearshore coastal waters along the coast of the Arctic National Wildlife Refuge.

In the east section of the coast, from the Canning/Staines River delta eastward to the Alaska-Yukon border, there are few large river deltas. The barrier islands are like long, semi-continuous spits, and the lagoons are generally narrower and shallower than those to the west.

A summary of the seasonal uses birds make of the proposed study area follows:

Seasons-Locations-Bird Use

Spring breakup-Hulahula/Okpilak River-Migrating waterfowl

-Delta and shorebirds
-Jago River Delta
-Aichilik/Egaksrak River
-Delta
-Kongakut River delta

Summer-Barrier Island-Lagoon-Molting and feeding

-System from Arey Island-seaducks, staging and
-Eastward to Demarcation-feeding shorebirds
-Bay

Fall freeze-up-NA-NA

Winter-NA-NA

The two time period, Fall freeze-up and Winter, are the periods when seismic activities will occur under the terms of the proposed permit and no negative impact is anticipated. During the course of the proposed program, extreme care will be exercised to prevent any damage to the areas that will be used by the bird population in the spring and summer months.

TERRESTRIAL MAMMALS

Terrestrial mammals may be affected both directly and indirectly by seismic activity in the coastal plain area of the Arctic National Wildlife Refuge. With the knowledge WESTERN possesses concerning the occurrence and characteristics of these species, the COMPANY will be able to avoid any significant adverse affect. Species which are ecologically and/or economically important are included in this discussion.

Arctic Fox

Although the arctic fox is economically important as a furbearer and biologically important as a predator of small mammals (Chesemore 1967), little demographic information is available for this species along most of the Beaufort Sea Coast. Based on fur harvest returns, however, population numbers show three to four year cycles (Chesemore 1967).

Arctic foxes appear to undergo distinct seasonal movements although some in the Prudhoe Bay Region are year-round residents (Fine 1980). During the fall and early winter, Arctic foxes generally move seaward toward the coast and sea ice, presumably in search of better food supplies (Chesemore 1967). By late winter to early spring most have returned inland to mate and pup. Hunting may be extensive; Underwood (1975) estimated that Arctic foxes may actively hunt areas as large as 500 sq. km.

Dens are usually constructed on sand dunes, eskers, hilltops and river banks, wherever frost-free soil is available (Chesemore 1967; Eberhardt 1977; Fine 1980). Dens appear to be common along banks of most rivers on the coastal plain.

Adequate information on Arctic foxes is available only in areas. The location of large denning concentrations outside this area (if they exist), seasonal movements (particularly during the winter season), better estimates of population densities for the coastal plain area of ANWR, and demographic information on recruitment and natural mortality are the main data gaps that are necessary to fully evaluate the potential effect of exploration on the arctic fox population.

Experience (twenty-six years in the Arctic environment) has shown that Arctic foxes are attracted to man and studies indicate that the Prudhoe Bay area has the highest density of denning (1 den/15 sq. km.) recorded in contrast to other study areas. Foxes have been known to attach themselves to one of our camps and follow it for weeks before leaving.

The personnel who will be involved in the proposed exploration will be thoroughly briefed in the known data relative to Arctic foxes and will be warned as to the possibility of the foxes being rabid. The denning locations cited by Chesemore, Eberhardt and Fine all occur in terrain features that normally are avoided by seismic crews both because of the difficulty of operations and the special stipulations attached to Permits.

Musk Ox

In the 1800's muskox populations in the proposed study area were drastically reduced, and then exterminated (Bos 1967; Roseneau and Stern 1974a). Muskox were reintroduced to the Alaskan North Slope in 1969 as part of an Alaska Department of Fish and Game Program to re-establish muskox throughout their historical range (Jennings and Burris 1971; Alaska Department of Fish and Game 1977). In the spring of 1969, 52 muskox were transplanted from Nunivak Island to Barter Island. The following summer an additional 13 muskox were transplanted to the Kavik River.

The Arctic National Wildlife Refuge contains the only major concentration of muskox in the North Slope area. The size of the group was estimated to be 36 to 41 animals in 1972 (Roseneau and Stern 1974a) and had increased to an estimated 90 animals in 1977 (Bente 1977a). Presently, animals appear to be concentrated in three areas: the coastal area near the Canning River; the area between the Sadlerochit and Hulahula Rivers; and along the coast near Jago, Egaksrak and Aichilik Rivers (Roseneau and Stern 1974a; Bente 1977a). During the period of 1978 to 1979, the Sadlerochit herd appeared to have split into one main herd and two satellite (possibly bull) herds (M. Spindler, U.S. Fish & Wildlife Service, pers. comm.). These areas have been noted and will be given to field crews as an overlay drawn to the same scale as the program map. Any proposed lines nearing these areas will be cause for WESTERN GEOPHYSICAL COMPANY to contact the Service for guidance and inspection before proceeding.

Muskox breed in late July and August, and give birth in late April to May (Tener 1965). Our seismic activity during this time frame will be non-existent with all movement in the muskox habitat ruled out because of weather and ground conditions. All crews will normally be stacked on summer storage sites outside the Refuge on or before May 15th of any given year.

Muskox appear to summer along the coastal plain and gradually move to upland areas to overwinter (Roseneau and Stern 1974a; Bente 1974a). Winter ranges appear to vary greatly between years (M. Spindler, U.S. Fish & Wildlife Service, pers. comm.). Within the muskox range, corridors along the major river drainages, particularly where the productivity of the riparian community is high, are presently considered critical habitat (M. Robus, Alaska Cooperative Wildlife Research Unit, pers. comm.; M. Spindler, U.S. Fish & Wildlife Service, pers. comm.). All WESTERN GEOPHYSICAL COMPANY crews will be alerted to these critical areas before any work begins in the Refuge.

Information on muskox distribution along the Alaskan Beaufort Sea coast is sufficient to delineate the area between the Canning River and the Alaska/Yukon border as the most important muskox range in the North Slope region. However, information on critical habitats (calving grounds, wintering areas, foraging areas), seasonal movements, and herd dynamics (numbers, natality, recruitment, natural mortality) is not adequate to identify specific geographic areas. Seasonal movements and critical habitats are very poorly understood and the opportunity for FWS to collect some much needed data is present during the course of the proposed seismic exploration by utilizing WESTERN GEOPHYSICAL COMPANY facilities and logistic support.

Caribou

Two caribou herds, the Porcupine and Central Arctic, are involved in the proposed study area. The Porcupine Herd (estimated at 110,000 animals in 1979) is one of the largest caribou herds in North America. The scope of its range covers some 250,000 square kilometers in northeastern Alaska and northwestern Canada. The spring migration usually begins in early April and arrival date of the pregnant cows on the traditional calving grounds seems to be dependent on the snow conditions and the location of the wintering site.

Caribou of the Porcupine Herd usually enter the calving area within the proposed study area during mid-late May (a time period when all seismic activity has been shut down). The first calves are born during the last week in May, with the peak of calving occurring between June 5 and 9. Although calving has been observed in a variety of terrains, most calves are born in snow-free areas of tussock uplands. Major calving concentrations of the Porcupine Herd have occurred in the study area between Camden Bay and the Sadlerochit Mountains (from the Canning River in the west to the Sadlerochit River). Concentrations of calving activity also occur within the ANWR study area along the foothills from the Sadlerochit River to the Aichilik River. Scattered reports of calving have been reported throughout the study area.

Following the calving period, maternal groups of the Porcupine Herd usually move northward and westward, gradually coalescing into aggregations. By late June it is common to find huge aggregations (80,000 or more animals) in the study area between Camden Bay and the Sadlerochit Mountains. In early July these great herds move to the east, usually reaching the Canadian border by mid-July.

The Central Arctic Caribou Herd currently numbers about 7,000 to 9,000 and has recently been increasing. It occupies a range which is entirely north of the Brooks Range continental divide, from the Itkilik and Colville Rivers on the west to slightly east of the Canning River. The Trans-Alaska Pipeline (TAPS)-Dalton Highway corridor and the Prudhoe Bay-Kuparik oilfields lie within the herd's range. These intensive man-made activities have done nothing to deter the herd's natural cycle. No calving has been observed in the TAPS-Prudhoe Bay oilfield area since about 1973, but the fact that the herd is on the increase indicates that the caribou have adjusted and flourished. Caribou of the Central Arctic Herd use the ANWR study area (Canning River Delta and coastal habitats along Camden Bay) for post-calving activities and insect relief. Residents of Kaktovik harvest Central Arctic Herd Caribou from coastal areas during the summer. During some winters, scattered groups of caribou, believed to be of the Central Arctic Herd, range through the proposed study area and adjacent uplands to the south.

Any contact WESTERN GEOPHYSICAL COMPANY crews experienced with either the Porcupine or Central Arctic Herds would be with strays and would not occur during critical calving or post-calving time periods.

(13) Certification.

By its submission of this document and the affixation of its officers' signatures thereto, WESTERN certifies that it will, if authorized to conduct exploratory activities, comply with all pertinent provisions of 50 C.F.R. Part 37, its Approved Exploration Plan, its Plan of Operation, and all reasonable stipulations, demands, and orders issued by the Regional Representative or his authorized representative.

In addition, WESTERN will comply with all existing federal, state, and local laws and regulations as well as those that may become effective during the course of the proposed exploration. A certification to this effect is appended hereto as Exhibit "F".

(14) Data Quality Assurance and Control.

Of the numerous qualifications possessed by WESTERN that render the COMPANY suited to lead the exploration effort in the ANWR, one of the most distinctive is the integrated and sophisticated data processing center located at the COMPANY's base camp in Deadhorse, Alaska. The capabilities of this system, which were already state-of-the-art prior to 1982, have now been increased by virtue of the recent addition of a Litton Resources System

LRS-3200 Seismic Data Processing System. The LRS-3200 possesses a radically new structure with the capability of expanding many times over to accommodate the ever increasing volumes of data that result from advances by WESTERN in the technology of data acquisition. In its minimum configuration the LRS-3200 has twice the capacity of the most powerful mini-system on the market. Its maximum configuration competes with the largest "large" system available.

Because of recent expansions in the capabilities of seismic exploration, the quantity of data that must be processed is rapidly increasing to enormous levels. Thus, the concept of "data quality assurance and control" is one that is continually growing in sophistication. The seismic data processing system possessed by WESTERN at its Deadhorse Base Camp is now capable of handling large computational and input/output loads.

Consequently, there are two compelling features that WESTERN offers in terms of its data quality assurance and control. First, the sophistication of the processing system employed by the COMPANY. Second, the proximity of the geographic location of the facility at Deadhorse. The combined result of these factors is that data that are collected in the field during the day are immediately processed at the Deadhorse facility with results obtained therefrom in a matter of hours. These results enable the crew operations to determine whether the parameters selected are achieving the desired data quality. As a direct result of the proximity of the Deadhorse facility and the sophistication of the seismic data processing system located there, WESTERN is able to ascertain immediately whether deviations or corrections are necessary in the technical parameters of the field operations. This prevents unnecessary duplication of effort that could result if the field data had to be flown to a distant location or processed in a less sophisticated facility in order to determine the integrity of the results.

The survey data acquired during the course of a work day can be processed with the same speed and efficiency as the seismic data. In two hours basic field notes can be fed into a Hewlitt-Packard 85 computer located in the Deadhorse facility. A hard copy can be generated of a line map showing VP's, elevations, and the necessary reference points to indicate the accuracy of the survey. Any corrections can be applied immediately before further errors occur which could introduce an unnecessary duplication of the line.

In addition to the timely data processing that takes place at the Deadhorse processing facility following each day's collection of data, daily similarity tests are taken before the crew begins the day's program. This is a method of ensuring that the vibrators are in sync and will produce the maximum usable energy. This test also allows a check of instrument functions as well as a sure check of the mechanical condition of the vibrator units.

To supplement the daily routine tests, all instruments are subjected to both monthly and semi-monthly tests that are performed in the field with the

tapes being sent to our Quality Control Section in the Houston Main Office. The test data are compared to specifications of new equipment. The results of the tests are telexed to the Anchorage Office immediately and this information is relayed to the field crews via telephone and radio lines.

There are also two qualified technicians available at the Deadhorse base camp who are on call should any problem occur. Test gear and spare units are available. In case an instrument should malfunction, it is a matter of hours before the replacement unit is on the crew and operating.

These technicians maintain a routine schedule of visits to the crews and consult with the Observer as to the condition of the equipment thereby assuring that the quality of the data is always up to WESTERN's high standard.

To comply with the newly added requirement for an explicit provision for the independent checking of data quality, WESTERN GEOPHYSICAL COMPANY has retained a highly qualified, independent, professional consultant, Dr. Norman Neidell, who, in the event that a permit is issued, will oversee WESTERN's procedures and processes in the taking and reduction of data. Dr. Neidell will advise WESTERN as to the status of its performance in the conduct of the survey and will report his observations and conclusions directly to the designated government representative. Dr. Neidell's curriculum vitae is appended as Exhibit "G".

Even though WESTERN is proposing a speculative survey it will, in the event a permit is granted, follow the customary procedure of accepting advance commitments to purchase the resulting data and will afford purchasers the opportunity to oversee the exploration program on a current basis.

V. SUMMARY

WESTERN hereby requests that we be named as a single permittee to conduct a speculative seismic survey in ANWR using two crews each for one season to collect some 750 miles of data which would be available for sale to interested parties according to a published price list.

We have the equipment and manpower already in Alaska plus the fiscal capability to conduct this survey. WESTERN's reputation in the geophysical industry worldwide and particularly in Alaska is unparalleled Our final processing of data from the North Slope is recognized as the industry standard. We will carry out a seismic survey of the highest quality which will be beneficial to the Secretary, to FWS, to the oil industry, and to any other interested parties.

We have demonstrated in the preceding pages our knowledge and appreciation for the environmental and wildlife aspects involved. You have our assurance of fullest cooperation in seeing that the goals of this project are met to the satisfaction of all concerned.

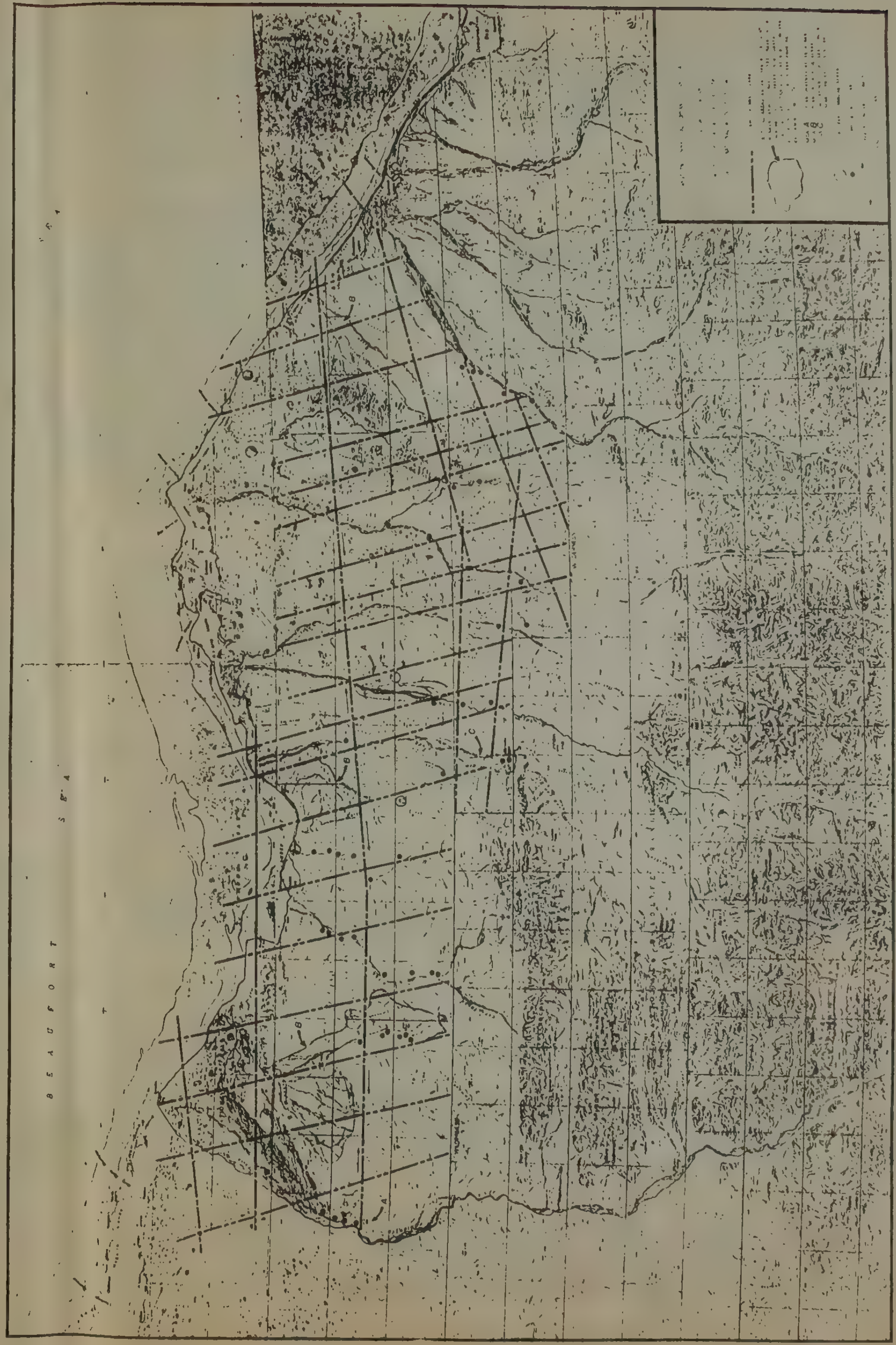
We further state that the proposed activity complies with the State of Alaska's approved Coastal Management Program and will be conducted in a manner consistent with that program.

WESTERN will be pleased to furnish any additional information that may be required in connection with this submission. Inquiries should be addressed to Mr. Semeliss or Mr. Cramer at the addresses or telephone numbers given on page 3.

We will appreciate your favorable consideration of this application.

Respectfully submitted,

WESTERN GEOPHYSICAL COMPANY OF AMERICA



PERMIT ATTACHMENT 2

Known Cultural Resources Within Project Area: WESTERN GEOPHYSICAL

Map Reference	Cultural Resource* Site in Apparent Conflict With Seismic Line
BLM 1	Native cemetery on Eskimo Island
BLM 2	Native grave on Atigaru Point
BLM 3	TLUI site NE of VABM "creek"
BLM 4	TLUI site NW of VABM "Thomas"
BLM 5	TLUI site NE of VABM "creek"
BLM 6	Niglik and sites in vicinity; sod house ruins and Native grave
BLM 7	TLUI site; structural remains
BLM 8	TLUI site; structural remains
BLM 9	TLUI site; structural remains
BLM 10	Numerous late prehistoric and historic sites, including sod house ruins and reindeer corral
BLM 11	TLUI site; sod houses
BLM 12	TLUI site; trading post, grave
BLM 13	TLUI site
BLM 14	TLUI site; cemetery
BLM 15	TLUI site; graves

*Cultural resources include archaeological, historical, and traditional land-use inventory (TLUI) sites.

NOTE: THESE SITES SHALL BE AVOIDED BY ALL SEISMIC EQUIPMENT AND FIELD CREWS.

EXHIBIT "B"

PERMIT ATTACHMENT 3

Native Allotments Located in the General Area of Proposed Seismic Programs

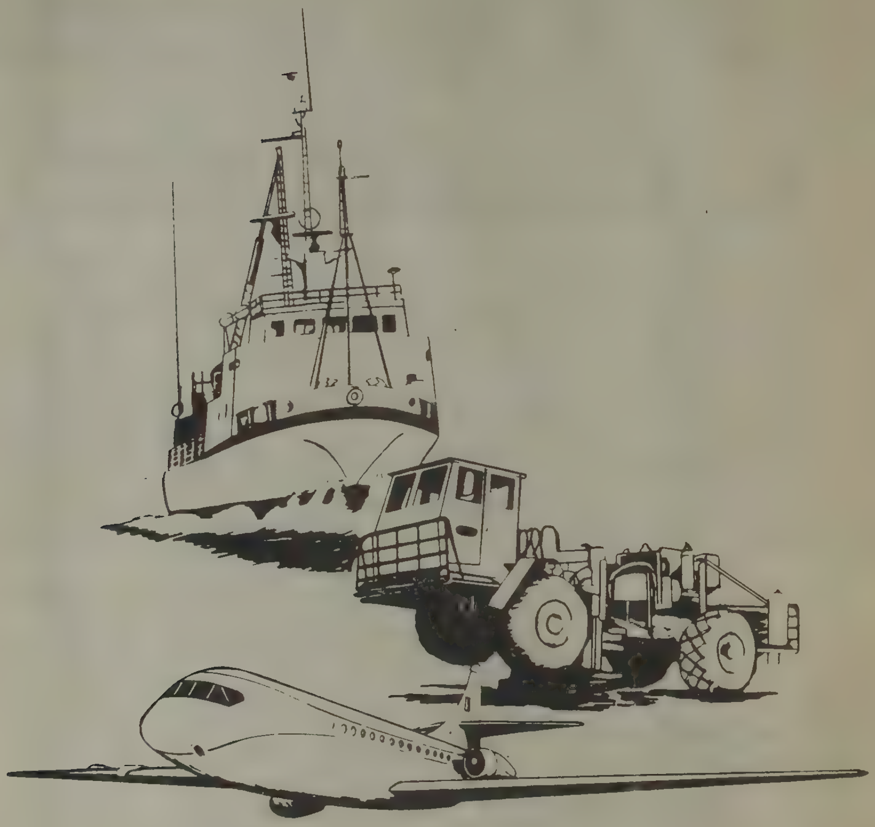
WESTERN PROGRAM F-72685

Map Reference	Number	Name	Acres	Location
1	F-18134	Paul Ogroogak	160	Sec. 32, T9N, R4E, UM
2	F-11943	Lydia Sovalik	80	Sec. 15, 16, 21, 22, T12N, R4E, UM
3	F-11947	Nannie Woods	160	Sec. 15, 16, T12N, R4E, UM
4	F-14613	Edward Itta	160	Sec. 16, T14N, R4W, UM
5	F-14616A	Noah Itta	40	Sec. 29, T15N, R3W, UM
6	F-14645	Dorcus Watson	160	Sec. 29, T15N, R3W, UM Sec. 7, T17N, R1W, UM
7	F-14611	Brenda Itta	160	Sec. 12, T17N, R2W, UM

EXHIBIT "C"

Litton

WESTERN GEOPHYSICAL



Oil and Hazardous Substances Contingency Plan

EXHIBIT D

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INTRODUCTION

Federal laws, State regulations and WESTERN GEOPHYSICAL COMPANY's keen desire to protect the environment from the harmful effects of oil or other hazardous substances require a definite, meaningful plan.

The very nature of WESTERN's work creates problems not found in other types of operations. The almost constant moving of camps and supply points, the need for enormous quantities of fuel and the remote location of the prospects are all factors that create a high risk situation. We must therefore practice extreme care in the transportation, storage and ultimate use of any and all materials that, if allowed to escape containment, could upset the delicate balance of Alaska's ecosystem.

The prevention of oil spills or loss of hazardous substances involves many factors. Common sense is the number one deterrent to unfortunate incidents. Checking the joint between the tank and the discharge valve, scheduled visual inspections of the tanks and placing fuel barrels bung up are all simple items but any one of them could spell the difference between a satisfactory, productive operation and a serious, costly spill. Double check every phase of the operation to which you are assigned and are responsible for. Think.

Should a spill occur it becomes your legal responsibility to report it to the proper agencies as soon as possible. The Plan, with the annexes, will explain in detail how to do this. No attempt to conceal any spill, no matter how small, should ever be made by WESTERN employees or their contractual personnel. The reasons for this are many and varied. What may appear to you as a minor, harmless spill could become serious if not properly contained or dispersed. State and/or Federal agencies have the expertise to accurately analyze the situation and make recommendations for remedial action. In addition, Federal agencies have the power, under the provisions of Pl 92-500 (86-Stat816), to call on any other Federal agency for assistance in case of a serious threat to life or property. It is doubtful if WESTERN's type of problem could ever reach that magnitude, but it is comforting to know that this type of back-up is available.

After the report has been made and the proper agencies have investigated the incident, the spill must be cleaned up to the best of our ability. What appears to be the most expedient method of getting rid of spilled fuel, burning, might not really do the complete job. In fact, there may be harmful after effects if hasty judgment dictates our initial approach. Generally speaking, the proper sequence should be:

(1) Stop the flow of oil or hazardous substance at the source, and while doing this you should exercise extreme caution using good safety habits. We do not want personal injury added to the problem.

(2) Make every effort to contain the spill in an area as small as possible. While doing this, care should be taken to prevent damage to the environment by other methods.

(3) Report the spill, using the procedures described in the Plan. If conditions permit, the reporting of the spill should precede the other steps but this assumes that sufficient manpower is available and the location is such that prompt reporting is possible.

In summary, we, as WESTERN employees, must do everything in our power to prevent unfortunate incidents. Safe, careful work habits will do much to insure that we can continue to do our assigned jobs without the tremendous amount of extra labor involved in a spill. If one should occur we will do everything possible to minimize the harmful effects and promptly report to and cooperate with all regulatory agencies.

OBJECTIVES

(a) This plan, including the annexes, provides for a pattern of coordinated and integrated responses by WESTERN GEOPHYSICAL COMPANY employees, WESTERN's contractors and state and federal agencies to protect the environment from the damaging effects of pollution discharges. It promotes the coordination of all systems and encourages the development of the capabilities of all involved units.

(b) The objectives of this Plan are to provide for efficient, coordinated and effective action to minimize damage from oil and hazardous substance discharges, including containment, dispersal and removal. The Plan, including annexes, provides for: (1) Assignment of duties and responsibilities among WESTERN GEOPHYSICAL COMPANY employees, WESTERN's contractors and state and federal agencies; (2) Identification, procurement, maintenance and storage of equipment and supplies; (3) Establishment or designation of response teams to provide the necessary services to carry out the Plan; (4) A system of surveillance and reporting designed to insure the earliest possible notice of discharge of oil and hazardous substances to appropriate agencies; (5) Procedures and techniques to be employed on identifying, containing, dispersing and removing oil and hazardous substances; (6) A schedule, prepared in cooperation with suitable agencies, identifying dispersants and other chemicals, if any, that may be used in carrying out the Plan.

REPORTING

All reports of oil spills or discharge of hazardous substances should be completed as soon as possible after discovery. Prompt action is necessary to minimize the damage and relieves the problem of confusion that might arise if reports have to depend on memories for accurate facts after the incident is over. At this point, it might be well to mention that you are urged to report infractions by others as well as your own. There are recorded cases where WESTERN has been blamed for spills simply because we were in or near the area. We are not in the police business but it is our legal and moral duty to report all sightings and our responsibility as WESTERN employees to protect our COMPANY's interest.

The United States Coast Guard is the prime agency for reporting all sightings. They then relay, depending on the location and type of spill, the pertinent information to the appropriate agency, such as the Department of Environmental Conservation, the Environmental Protection Agency or any other applicable group.

To insure a clear transfer of information you should familiarize yourself with ANNEX "A". It is a copy of the form that the Coast Guard uses to record all incoming reports. Plan your call so as to have the maximum information that would fill in the blank spaces. There is a 24 hour service at the CG office but, in some cases, you may get a tape service known as AUTOVON (Automated Voice Network) or the FAA duty officer. In any case, the traffic will be channeled to the proper agency for action. Be sure to record the time and date of your call in the Party Log and, if at all possible, the name and rank of the CG member who received your call.

When reporting the location of the spill try to be as definite as possible. If you have a map you should pin-point the spill by placing it in a certain part of a particular range and township and indicate the map you are referencing. Include ground features if any are available. River intersections, air strips or pipe line camps are very helpful. Remember, someone is going to try to find you and the point you are describing.

ANNEX "B" diagrams the normal channels for field crews to use in reporting in. Contact with Party Office, after initial sighting, should be done by radio or by messenger. All details should be as accurate as possible since the message will have to be relayed several times in most cases. From the Party Office, the information will be forwarded to the most convenient WESTERN installation having telephone communications. At this point it is extremely important that the Supervisor be notified. From his office in Anchorage he will handle all further coordination with the CG and begin to take whatever steps are necessary to handle the situation. Field personnel will take any steps required to protect life and property and stand by for further instructions.

Any requests from the news media for information concerning the spill should be referred to the Supervisor. This is important so that there will not be any confusion or adverse publicity arising from distorted facts coming from sources that may not be aware of the entire picture. Inquiries from a governmental agency representative, after they have properly identified themselves, should be answered directly and honestly. Do not, repeat, do not try to give opinions, suggestions or theories about the cause or the effect of the spill to anyone until you have been briefed by the Supervisor or his agent.

It shall be the direct responsibility of all Party Managers to do everything possible to prevent oil spills. All personnel under the Party Manager's supervision must be instructed in the basic fundamentals of fuel storage and transfer and crew members actually handling fuel will be required to read and be familiar with this Plan and all other applicable State and Federal regulations. This Plan will be the subject for discussion at a weekly Party Safety Meeting as soon as practical after the start-up crews.

The Party Manager, or his designated agent, shall supervise the erection of storage facilities, fuel transfer and on-site storage of fuel. In line with this surveillance, the Party Manager will maintain an accurate inventory of all petroleum products charged to his Party. This inventory will include quantity, type of fuel and its specific location. In the case of fuel in transit, the inventory will include the above, plus the point of origin and the destination.

Normally, the Party Response Team will be composed of Party Manager, the Field Clerk and the Chief Mechanic. Within this framework, the Party Manager will assign certain specific duties and responsibilities in the event of a spill. Adequate back-up will be assured by naming alternates for each primary man on the Team. Names and duties of the Response Team will be supplied to all key party personnel concerned, to all base camps, other Party Offices and the Anchorage Office. This is important in the event of a spill during the transportation of fuel charged to a particular Party but occurring near the site of another Party's camp. In any case, the primary responsibility rests with the Party to which the fuel is charged. If fuel is to be handled by contractual personnel, it shall be the Party Manager's duties to be sure that they are familiar with this Plan and have the names and location of the Response Team.

All equipment used in the transfer and transportation of petroleum products will be inspected on a regular schedule. The time, date and location of these inspections will be recorded in the Party Manager's log. Any defects or malfunctions will be noted along with the steps taken to repair or replace the defective components.

STORAGE OF FUEL

In line with the provisions of state regulations all tanks will be installed in a dike that will form a holding area with 115% of the capacity of the tank. The dike, or its liner, must be impervious to the liquid to be stored therein and should be constructed in a neat and workmanlike manner. In no case will tanks be manifolded. If possible, thought should be given to drainage, access, future cleanup and general suitability when erecting any tank. All installations should be inspected on a scheduled time interval, never to exceed twenty-four (24) hours. The tank with its associated plumbing, the dike and surrounding area should receive close scrutiny. Check the contents of the repair kit to see if anything has been removed,

STORAGE OF FUEL (Continued)

and any shortages should be reported for immediate replacement. If snow and/or trash has accumulated, it should be removed. All warning signs should be in their proper place and in a good state of repair. During this daily inspection, this amount of fuel in the tank, as determined by visual monitoring device, will be recorded. Strict adherence to this procedure will help prevent the possibility of pollution from small leaks that if left undetected could become major sources of spills.

SPILL CLEANUP

If the source of a spill is readily ascertained and can be terminated, it should be done immediately. Accidentally opened valves, faulty discharge lines or leaks in the tank itself should be repaired or corrected as quickly as possible. If assistance or extra equipment is needed it should be called for as soon as possible.

Make every effort to contain the spill to a small area but use good judgment by viewing the overall effect of the spill. It is extremely important that you report the spill, using the methods described earlier in this Plan. Major spills will, of course, require equipment and expertise not available in the field to affect the cleanup and recovery of the pollutant. Prompt, accurate reporting is the key to preventing further contamination.

Initial Pollution Report No.

Date/Time Report Received ______________ Time FAA Duty Office Received ______________

Report Received From:	**Other Persons Involved in Sighting**
Name:	
Company:	
Address:	
Phone:	

Time of Occurance ______________ Length of Time Spill Occured ______________

Location: Initial ______________

Follow Up ______________

Type and Quantity of Spill ______________

Description of Slick (Ashore and Afloat) ______________

Apparent Hazard to Life and Property ______________

Damage ______________ Injuries ______________

WX (At Scene) Temp ______________ Tide Condition ______________

Wind Direction and Velocity ______________ Next High/Low ______________

Visibility ______________

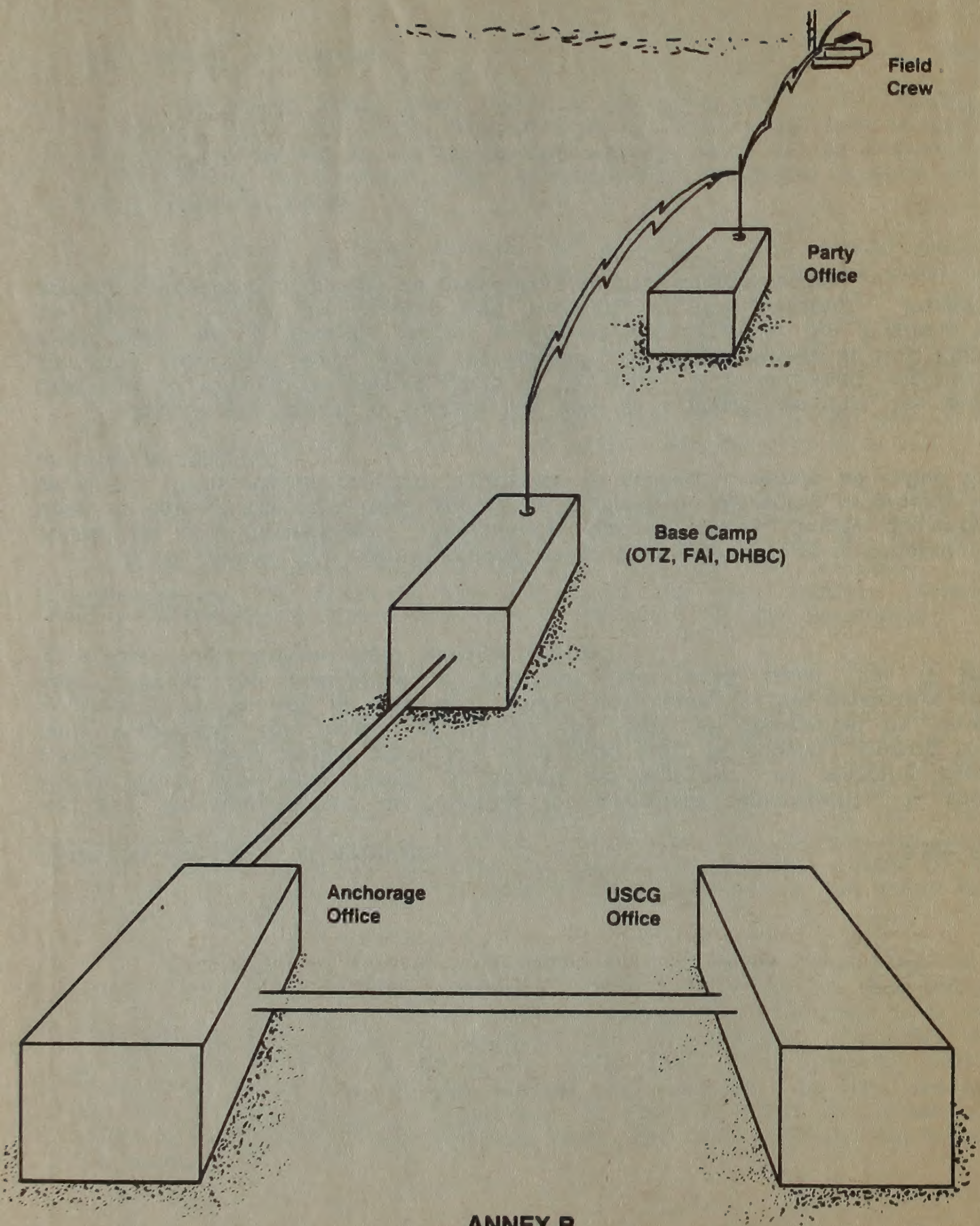
Initial Action Taken by Persons on Scene (To Stop Spill) ______________

(To Clean Up) ______________

Company Intended Action ______________

Coast Guard Action ______________

ANNEX A



ANNEX B

Western Geophysical Co.
of America

Fuel Storage Site
Daily Check List

Location ______________________ Date ________ 19 ______

	Satisfactory	Unsatisfactory	Remarks
A - Overall site condition	☐	☐	______
B - Fittings and connections	☐	☐	______
C - Sign placement	☐	☐	______
D - Dike and liner	☐	☐	______
E - Tank	☐	☐	______

Fuel withdrawn last 24 hours ____________ gals

Fuel gained last 24 hours ____________ gals

General Remarks ______________________

Time ____________ Date ____________ Signed ______________________

ANNEX C

WESTERN GEOPHYSICAL COMPANY
SAFETY RULES FOR
FUEL STORAGE & TRANSFER

1. Any and all personnel assigned to the operation of any WESTERN GEOPHYSICAL COMPANY fuel supply and/or transfer will be familiar with the Contingency Plan as developed for the procedures in case of a spill.

2. During the storage and/or transfer of fuel there will be at least one employee with a valid First Aid card on site. An adequate First Aid kit will be available at the site.

3. There will be no smoking within 100 feet of any fuel storage area and visible signs will be posed in prominent locations to indicate this. During the transfer of fuel from any carrier to a tank or from the tank to a carrier, there is to be absolutely no smoking in the area. In addition, any specific rules imposed by carriers will be obeyed by all WESTERN personnel.

4. Each vehicle involved in fuel handling will be equipped with a fire extinguisher of the proper size and type so as to comply with current State and Federal regulations. All men will be trained in the operation of the extinguishers.

5. All discharge lines from any tank, either fixed or mobile, will be tagged so as to indicate the contents of the tank. No WESTERN personnel will use or allow the use of any fuel unless it comes from marked containers.

6. All installations will be kept in a state of good repair and any defects in the tank or fittings will be repaired as soon as possible. No trash or litter will be allowed to accumulate in the immediate storage area and excess snow will be removed from the tanks and dikes as soon as possible.

7. Emergency repair equipment and tools will be kept at the tank site and their location will be made known to all personnel involved in the fuel storage operation. Any shortages will be made known to the Party Manager as soon as possible. The use of any of this equipment for any use except emergency is strictly prohibited.

8. No fuel transfers will be made with any equipment that does not meet the requirements of the General Safety Code. If there is some question about compliance consult the Party Manager.

9. These regulations are for your safety and any infraction could be cause for disciplinary action or dismissal.

SUMMARY

This Plan, with its Annexes, has been formulated to help WESTERN GEOPHYSICAL COMPANY employees prevent oil spills and to assist them in the event a spill should occur.

The three key points to remember if an oil spill should become your problem are:

1 - STOP THE FLOW AS SOON AS POSSIBLE

Use any safe, practical means at your disposal. Remember to locate and check the operation of all valves daily. Check your tank emergency repair kit and know how and when to use it. Remember that every gallon you keep from leaking is one less to clean up later.

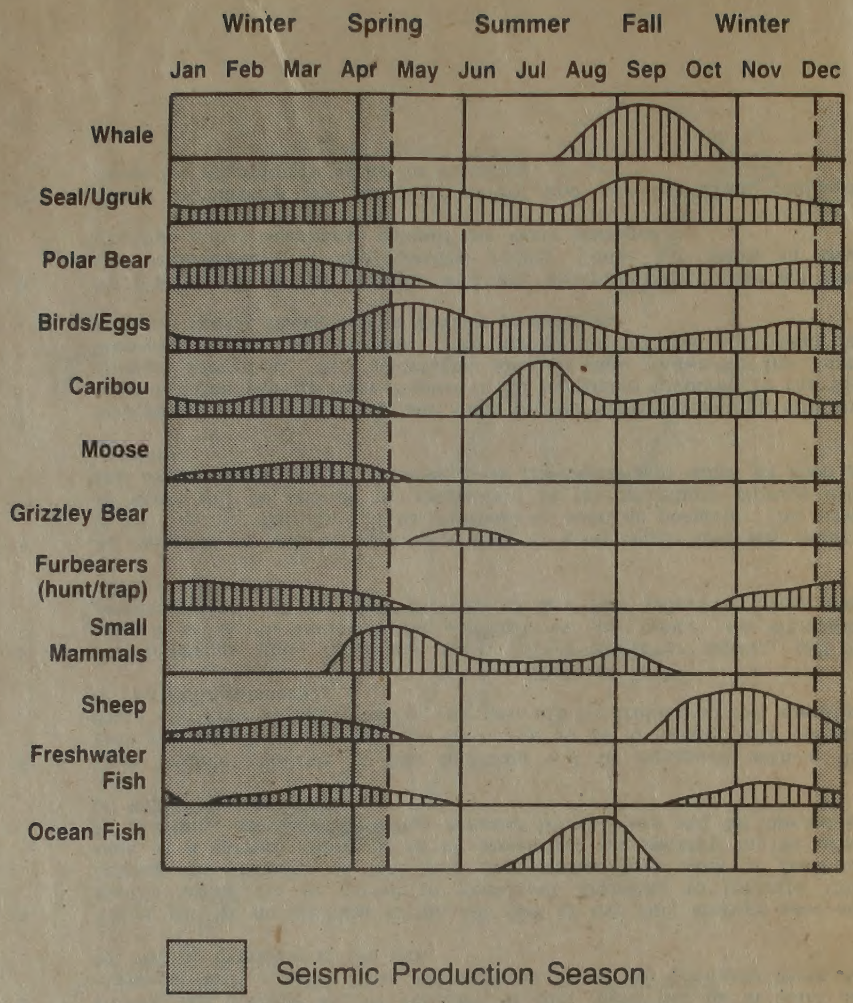
2 - CONTAIN THE SPILL IN THE SMALLEST POSSIBLE AREA

Sound judgment is the key to good containment. Keep in mind that other regulatory agencies have very definite ideas about what you can or cannot do with the natural resources around the fuel site. If you use the material around the spill to create a secondary dike be sure that it can be restored to its original condition after clean up is completed. During tank installations you should always be thinking of the responsibility of a spill and note any material at or near the site that could be utilized.

3 - REPORT THE SPILL THROUGH THE PROPER CHANNELS AND INITIATE CLEAN UP PROCEDURES

Prompt, accurate reporting is imperative and should be done as soon as possible after discovery of the spill. If the spill is minor and the clean up is obvious you should go ahead but if a major spill occurs you should stand by for detailed instructions. Remember that disposal of waste created by clean up has to be taken care of properly and not left to create another problem. In some cases, this may require evacuation of the waste to a suitable site designated by the authorities.

In conclusion, you must do everything possible to prevent a spill but if one does happen you should STOP THE FLOW, CONTAIN THE MATERIAL and REPORT AND CLEAN UP.



Yearly cycle of subsistence use at Kaktovik, Alaska. Patterns indicate desired periods for pursuit of each species based upon the relationship between abundance, hunter access, seasonal needs, and desirability.

EXHIBIT E

Exhibit F. Western Geophysical Company of America. Material on seismic lithologic modeling. This material could not be reproduced legibly in this notice. It is filed as part of the original document. Copies are available from: Regional Director, U.S. Fish and Wildlife Service, Attn: Oil, gas, and minerals coordinator (AWR/PSS), 1011 East Tudor Road, Anchorage, Alaska 99503 (Phone 907-786-3384 or 3398).

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